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PSYCHE

Vol. XLIX Sept.–Dec., 1942 Nos. 3–4

AN ANNECTENT GENUS OF CIMICOIDEA FROM BALTIC AMBER (HEMIPTERA)

By Robert L. Usinger

University of California, Davis, California

Among the Hemiptera in the Haren collection of Baltic amber insects submitted to me for study by Dr. F. M. Carpenter were five anomalous specimens of the superfamily Cimicoidea. Although bearing a superficial resemblance to certain Miridæ in body form and general facies, closer study disclosed several aberrant characters which suggest relationship with the Microphysid-Anthocorid complex. Actually these specimens do not fit any family as recognized at the present time and hence must assume a place among the annectent Cimicoidea made famous in recent years by Bergroth (1924, 1925), McAtee and Malloch (1924, 1926), and China and Myers (1929). Fortunately, some of these specimens are so beautifully preserved that structural details are more readily observed than would be the case with pinned specimens. The points still to be desired would be an unobstructed dorsal and ventral view, a clear view of the veins of the hind wings and a cleared dissection of the male genitalia. All other features show up as clearly as though the specimens had been mounted in Canada balsam.

Electrocoris new genus

Elongate-oval and moderately robust in body form, suggesting a Bryocorine Mirid at first glance. Head scarcely to moderately deflexed, the upper surface evenly arcuate from base of vertex to apex of clypeus and the gula well developed, as long or longer than buccal opening. Eyes broadly contiguous with pronotum. Ocelli distinct, located laterally on vertex well back near posterior corners of eyes. Antennæ inserted laterally immediately in front of eyes, relatively short and stout, the first segment shortest, third twice as long as first, second three times as long as first, and the last segment longest, one-fifth longer than second, the last two segments nearly as thick as basal segments. Rostrum curving downward and backward but not appressed to under surface of head and thorax and not fitting into a rostral groove; slender and reaching between middle and hind coxæ; first segment shortest, membranous, and concealed in all but one specimen where the beak is completely exserted; second segment half as long as third, the third and fourth segments subequal.

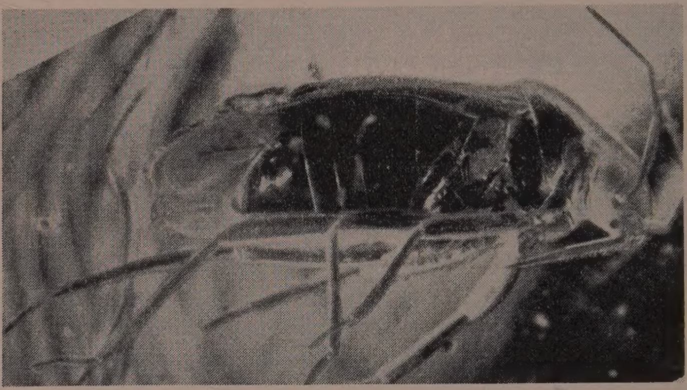

Fig. 1. *Electrocoris brunneus* Usinger. Allotype, no. 4540, Mus. Comp. Zool.

Pronotum about one-third longer than head on median line, moderately declivous, the disk distinctly punctate, its sides depressed and lateral margins roundly carinate and feebly sinuate. Posterior margin straight. Scutellum two-thirds as long as pronotum, scarcely elevated except at base, subequilateral, with acute apex.

Hemelytra well developed, the membrane exceeding tip of abdomen by one-sixth the total length of hemelytra; clavus and corium regularly punctate, with short hairs arising in the punctures; commissure of clavus half again as long as scutellum; corium feebly convex and interrupted along middle by a straight emboliar suture reaching three-fourths of distance to apex;

costal margin moderately arcuate, the edge rounded and uninterrupted, there being no trace of a cuneus or cuneal fracture. Membrane with four distinct, uninterrupted, longitudinal veins, the three inner veins arising from inner half of straight apical margin of corium and running slightly outward or toward the apex of membrane; fourth vein arising at outer fourth of apical margin of corium, curved inward basally and running parallel to other veins apically. Venation of hind wings obscured except in one badly spread specimen. The hamus and decurrent vein are apparently absent though the other veins are perfectly distinct.

Under surface convex, finely punctured and pubescent; ostiolar canals short but distinct, the edges feebly elevated, straight or slightly arcuate and located close to inner posterior margins of metapleura adjacent to hind coxæ. Abdomen with spiracles of segments two to seven clearly visible sublaterally, the posterior margins of segments three to six very straight and complete, that of second segment slightly sinuate but complete, reaching lateral margins. Seventh segment short and concave posteriorly in the male, leaving the strongly sclerotized eighth segment broadly exposed, the eighth segment twice as long as seventh at middle and the ninth segment or genital capsule enormously developed, convex, one-third as long as all the rest of the abdomen. The male capsule is apparently symmetrical and must completely enclose the ædeagus and parameres because only the convex capsule is visible in a perfectly clear side view. In the female the seventh segment is greatly enlarged, being half as long as the rest of the abdomen with its sides rather strongly rounded laterally and then nearly straight until rounded apex. This plate is not cleft and completely conceals the female genitalia.

Legs relatively stout and finely pubescent. Femora feebly incrassate, tibiæ cylindrical. Tarsi more slender, three-segmented, the first segment very short, second and third subequal. Claws slender and apparently without arolia.

Genotype: *Electrocoris brunneus* n. sp.

Electrocoris is unique in possessing distinct ocelli, an apparently three-segmented rostrum, three-segmented tarsi, four free longitudinal veins in the membrane without cross-veins or cells, a large and apparently symmetrical male genital capsule, an entire, unbroken corial margin without trace of cuneus, and a large, uncleft seventh abdominal sternite in the female without trace of an ovipositor. It runs directly to the Microphysid-Anthocorid couplet in China and Myers' key (1929) but does not fit either of these. All of the alternative characters given in this couplet are variable except the one concerning the symmetry of the male genitalia. *Electrocoris* fits the Microphysidæ in this critical character but agrees with the Anthocoridæ in all of the supplementary characters given.

Pachymerus senius Germar and Berendt (1856) may pertain to *Electrocoris* as indicated by the introductory paragraph of the original description. "Dies kleine, wenig über eine Linie lange Thierchen, erscheint in der Gestalt des Kopfes, des Halsschildes und der Fühler fast wie ein Capsus, und hat besonders mit Capsus capillaris im Umriss Aehnlichkeit, aber die deutlichen Nebenaugen zeigen, dass es in die Familie der Lygaeoden gehört." It is perfectly true that relationship with the Lygæidæ is indicated, not only by the presence of ocelli, but also by the absence of a cuneus and the presence of four free longitudinal veins in the membrane. However, the Lygæidæ differ fundamentally from the Cimicoidea in general in the possession of abdominal trichobothria and well developed arolia of an entirely different type from the arolia seen occasionally in the Cimicoidea. That *Electrocoris* has no abdominal trichobothria is indicated by several specimens in which the finest abdominal hairs are clearly visible. Lygæidæ likewise differ from *Electrocoris* in possessing a distinctly four-segmented, ventrally appressed rostrum, well developed bucculæ, more distinct and differently formed ostiolar canals, and a deeply cleft seventh female sternite which usually accommodates a well developed ovipositor.

There is also a possibility that the much discussed but little understood genus *Joppeicus* may be related to *Electrocoris*. Originally described as an Aradid by Puton (1881), *Joppeicus paradoxus* was later moved to the Lygæid subfamily Oxycareninæ by Bergroth (1898), and thence, as a separate family, Joppeicidæ, back to the Aradoideæ (Reuter, 1910). Mr. China (1933) reëxamined the species and again moved it to the Lygæoidea, this time as a separate family related to the *Clerada* group of Lygæids. I have never seen *Joppeicus* but, from a review of the literature including Bergevin (1911), its most important characters are: ocelli distinct, rostrum three-segmented, membrane with four free longitudinal veins, ostiolar canals absent, tarsi two-segmented, claws without arolia, spiracles two to seven ventral, seventh abdominal sternite cleft in the female. No mention is made of trichobothria. Obviously, *Electrocoris* is not to be confused with *Joppeicus*, but the systematic position of the latter should be studied carefully in any review of hemipterous phylogeny.

Electrocoris brunneus new species

Figure 1

Male. Body clothed with a rather short pubescence. Head moderately declivous, the gula about as long as buccal opening. Antennæ robust, proportion of segments one to four as 5:15:11:16. Legs relatively stout. Color of body uniformly light brown. Length 3.12 mm.

Female. Similar to male except for the genitalic differences described above, the slightly longer apical antennal segment (proportion of segments one to four as 5:15:11:18), and the shorter, more robust body form (length 2.51 mm. in the allotype and approximately the same in two partially obscured paratypes).

Holotype (4639), allotype (4640), and one paratype (4641), Museum of Comparative Zoology, Harvard University; and one paratype retained in my collection.

Electrocoris pubescens new species

Female. Body clothed with a relatively longer, fine, dense pubescence. Head only feebly declivous, the gular region over twice as long as buccal opening. Antennæ relatively slender, the proportion of segments one and two, 4::18, the apical segments broken off. Legs and particularly tarsi slender. Color of hemelytra dark brown, of body beneath, dark brown or nearly black with posterior margins of ventral segments pale. Length 2.5 mm.

Holotype (4642), female, Museum of Comparative Zoology, Harvard University.

Pubescens, though obviously related to *brunneus*, is strikingly distinct, the longer and denser pubescence, more porrect head, and darker color immediately setting it apart. Both of these differ from the possibly congeneric *senius* Germar and Berendt in which, according to their figure, the scutellum is longer than either the pronotum or the commissure of the clavus and in which the antennal and tarsal segments are differently proportioned.

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BLASTICOTOMIDÆ IN THE MIOCENE OF FLORISSANT, COLORADO (HYMENOPTERA SYMPHYTA)

By Robert B. Benson

British Museum, London

Among the fossil sawflies discovered at Florissant, Colorado, in Miocene beds was one described by Brues (1908) as being a very peculiar Tenthredinid, which he placed in a new genus and called *Paremphytus ostentatus*. At the same time he confessed that he had "not been able to locate the specimen with any degree of satisfaction." Rohwer (1908, p. 526) is also struck by the remarkable wing-venation of this insect, which he placed in the Tenthredinid subfamily Phyllotominæ.

Neither of these authors was familiar with the Blasticotomidæ which are only known now to occur in the palæarctic region and neither of them therefore recognized the remarkably similar wing-venation of the fossil *Paremphytus* and the living *Blasticotoma* (*cf*. Brues 1908, fig. 6 and MacGillivray 1906, fig. 44). The placing of *Paremphytus* in the Blasticotomidæ is further supported by its apparently argid-like antennæ as in that family.

Brues says: "Antennæ stout and thick and possibly with the last joint long as in *Arge* and its allies. However, this character is not very plainly to be seen on the specimen. . . . The similarity of the antennæ to those of Arge *et al*. is very striking, but it is possible that the last joint is in reality several closely united ones."

Unfortunately without the claws of the insect it is impossible to tell whether *Paremphytus* is likely to be synonymous with either of the two known recent genera of Blasticotomidæ, *Blasticotoma* or *Runaria*. Living members of the family now represent five known species and one subspecies. *B. filiceti* Klug is known in Europe and also as a distinct subspecies in east Asia including Japan. The four other species are limited to Japan and east Asia. As these insects are not often found on the wing even in districts where the larvæ are known to occur, living representatives of the family may yet be found in North America. The only described larva, that of *B. filiceti* Klug (Meijere 1911, p. 86, pl. v, figs. 1–12), is without abdominal legs and bores in a fern-stem, producing a peculiar irregular ball of froth about the size of a walnut on the side of the stem. The presence of the insect in a district is usually most easily detected by these balls of froth.

The representation of this family among the Florissant fossils is specially interesting because of the extreme rarity of the adults of the living species and suggests that they may have been more common as well as more widely distributed in Miocene times.

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NOTES ON NEARCTIC NEUROPTERA

By F. M. Carpenter

Since the publication of my revision of the Nearctic Hemerobiidæ and related Neuroptera,[1] several collections of these insects have been sent to me for identification. Notes on the most interesting and unusual species are included here. I am indebted to the entomologists mentioned below for the opportunity of examining this additional material.

Family Hemerobiidæ

Kimminsia involuta Carp.

In the Cornell University collection there are four specimens (♂ ♀) of this species collected in North Carolina ("N.C.") by F. Sherman, Jr. *Involuta* has previously been known only from western Canada, Idaho, Wyoming and Colorado. In all probability these specimens were found in the mountainous (western) part of N. Carolina, the insect fauna of which has several other species and genera in common with that of the north-western states.

Megalomus mœstus Banks

Several specimens (♂ ♀) were collected in the Black Hills, South Dakota (July 20, 1939) by D. J. and J. N. Knull (Ohio State University collection). The most eastern record of *mœstus* has previously been at Laramie, Wyoming.

Sympherobius angustus (Banks)

One female was collected in the Chirichua Mts., Arizona (July 15, 1939, D. J. and J. N. Knull); it is the first record of *angustus* in that state.

Sympherobius arizonicus Banks

The ♀ type has previously been the only specimen of this insect known to me. In the Ohio State University collection there are three additional specimens from the Santa Rita Mts.,

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[1] Proc. Amer. Acad. Arts and Sciences, 74:193–278, 1940.

Arizona (June 8 and 24, D. J. and J. N. Knull). Unfortunately, all of these are females, so that the male genital structure is still unknown.

Sympherobius occidentalis (Fitch)

One specimen of this rare insect has been collected in Indiana Dunes State Park, Indiana (July 27, 1940) by R. L. Wenzel (Field Mus. collection); this is the first record in that state.

Family Sisyridæ

Climacia areolaris (Hagen)

A number of specimens were collected at the Deschutes River, near Richmond, Oregon (July 28 and 31, 1939, Shuh and Gray); and others have more recently been collected near Tower, Minnesota (University of Minnesota collection). These records greatly extend the range of *areolaris*, which has not previously been reported west of Michigan in the north or New Mexico in the south. It will probably turn up locally across northern United States.

Family Berothidæ

Lomamyia banksi Carp.

A female collected at Buffalo, Texas (June 29, 1941, D. J. and J. N. Knull) is the first record in that state.

Lomamyia longicollis (Walker)

A male of this little-known insect is contained in the Uni-

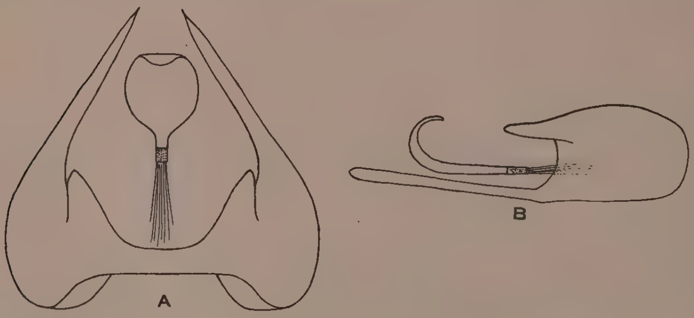

Fig. 1. *Lomamyia longicollis* (Walker) ♂, tenth abdominal tergite and ædeagus. A, dorsal view; B, lateral view.

versity of Kansas collection; it was found at Iuka, Mississippi (July 14, 1930) by R. H. Beamer (University of Kansas collection), and is the only male known to me in addition to the type in the British Museum. Since the male genitalia of this species have not previously been described, I include here (Fig. 1) a drawing of the 10th abdominal tergite and ædeagus. The tergite is similar to that of *tenuis* Carp., but lacks the anterior and posterior dorsal lobes. The ædeagus also resembles that of *tenuis*.

THE LYCÆNIDÆ OF THE BAHAMA ISLANDS (LEPIDOPTERA, RHOPALOCERA)

By Harry K. Clench

Cambridge, Mass.

So little has been written about the *Lycænidæ* of the Bahamas that it was thought advisable to publish some account of the species of this family that are known to occur there.

Due to a lack of complete information, it has been impossible to work out distributions among the islands of the group. As a result, this paper will be limited almost entirely to a systematic list of species, with such locality data as are available.

The history of the recorded Bahaman *Lycænidæ* may be summed up as follows: E. M. Sharpe (1900, pp. 199–200), in her account of a collection made on New Providence Island, listed three species; M. Bates (1935, pp. 189, 195, 197, 198) mentioned an additional four as occurring in the Bahamas, but gave no specific localities; and lastly, the author (1941, p. 3; 1941a, p. 407) added two more, bringing the total number known for the region to eight. An additional five in this paper raise that number to thirteen. This figure compares, now, more favorably with the sixteen species of Cuba.

Of the thirteen Bahaman species and races in this family, two species and three races are indigenous. The latter, quite naturally, show affinities with both Florida and Cuba, but appear to be more strongly connected with the latter.

The specimens upon which this paper is based are contained chiefly in the collection of the Museum of Comparative Zoölogy. The general arrangement follows Bates' 1935 paper, "The Butterflies of Cuba."

Genus Eumæus Hübner

1. Eumæus atala Poey

Eumenia atala Poey, 1832, no. 3, 3 figs.
Eumæus atala: Bates, 1935, p. 189.

I have seen but two Bahaman specimens, both badly worn. Insofar as can be determined, they do not differ from either Floridian or Cuban specimens.

Distribution. Great Abaco Island (Mathiew's Point, July 9, 1904). Also from Cuba and Florida.

Genus **Strymon** Hübner

2. **Strymon martialis** Herr.-Schäff.

Thecla martialis Herrich-Schäffer, 1864, p. 164.
Strymon martialis: Bates, 1935, p. 192.

This species is allied to the following, but the blue on the upper surface will at once distinguish it.

Distribution. New Providence Island (Mar. 12, 1934, Armour Exp.); Andros Island (Mangrove Cay, Aug. 1, 1904, O. Bryant); Cat Island (Arthurs Town, July 21, 1935, W. J. Clench); Conception Island (Feb. 12, 1934, Armour Exp.); Great Inagua Island (Feb. 1934, Armour Exp.).

S. martialis is also reported from Florida and Cuba. Bates' statement that it is found in "most parts of the West Indies" is open to question.

3. **Strymon acis armouri,** new subspecies

UPPERSIDE:

Both sexes brownish black. *Fore wing* in the female with a rather indefinite central patch of jet black. Male with a more definite and smaller central patch of the same color, in this case the scent pad, located on the outer end of the cell. *Hind wing* with the anal lobe orange, capped by a thick, short white bar. Between the lobe and the lower tail is a second, thinner, white bar, and between the two tails is a third. Basal to the second of these bars is a small, frequently obsolete, patch of white scales. Basal to the third bar is a patch of orange scales. The tail at Cu_1 is the shorter, as is customary in the genus, and both that and the one at Cu_2 are black, tipped with white. *Fringe* of both wings white, except at the anal lobe and the costal part of the outer margin of the hind wing which are brown.

UNDERSIDE:

Both sexes similar. Ground color grayish tan, rather dark. *Fore wing* crossed by a diagonal, rather thin, straight white line, basally bordered with black. This line runs from a point on the costa, two-thirds from the base, to Cu_2, about 3 mm. in from the outer margin. The inner marginal area from here is slightly grayer than the rest of the wing. *Hind wing* with a marginal white streak running from M_3 almost to 2A. Anal lobe black, surmounted by a white area. Between 2A and Cu_2 is a patch of gray and blue scales. Between Cu_1 and Cu_2, set back from the margin, is an orange patch, most intense basally. Adjoining this, in the Cu_2-Cu_1-M_3-M_2 interspaces are smaller orange patches, each of which is bordered outwardly with a small amount of white. Basal to these orange areas is a black line, parallel to the margin, and running from outer angle to Cu_2. Marginal to this, near the outer angle, is a heavy white band, a continuation of the white bordering of the orange patches, mentioned above. Between the orange patches and the white bar (the former merging into the latter toward the outer angle), and the outer margin is a strip of gray. Outward of this strip is a thin, thread-like line of white, running the whole length of the outer margin. From the center of the costa runs a continuation of the white line on the fore wing. It proceeds straight to a point on Cu_2 just basal to the large orange spot, where it angles sharply inward for a short distance, then downward, touching at 2A just basal to the patch of blue and gray scales, then inward again, reaching the inner margin at the center. Throughout its whole length it is basally bordered with black. Near the inner margin, and just marginal and parallel to the last segment of this line, is a black streak which basally limits the white patch next the anal lobe. In the basal area are two white spots, small, occasionally almost obsolete, which lie parallel to the body line. *Length of fore wing* as in the typical.

Holotype, male, Rum Cay, Bahamas, Feb.-March, 1934 (Armour Exp.).

Allotype, female, Arthurs Town, Cat Island, Bahamas, July 16, 1935 (W. J. Clench).

Paratypes, one female, same data as holotype; two females, same locality and collector as allotype, July 8, 16, 1935.

Holotype, allotype and two paratypes, M.C.Z. no. 25848. One paratype in the author's collection.

Remarks. This subspecies differs from typical (Florida) *acis* in the narrower post-discal white lines on both wings, and in the reduction of the orange patch on the under surface of the secondaries. This orange in typical *acis* is large and unicolorous, while in *armouri* it is much reduced and lighter marginally. The two basal spots on the secondaries below are usually smaller than in the typical form. Drury (1770, p. 2, pl. 1, fig. 2) gave in his description the locality "New York," undoubtedly false. No Cuban examples have been seen.

This subspecies is named for Mr. Allison V. Armour, of the yacht "Utowana," through whose efforts a large part of the museum's Bahaman butterflies were obtained.

4. **Strymon mæsites** Herr.-Schäff.

Thecla mœsites Herrich-Schäffer, 1864, p. 165.
Strymon mœsites: Bates, 1935, p. 194; Clench, 1941, p. 3.

Specimens from Florida and the Bahamas might each represent undescribed races, but they would at best be insignificant, and, for the present at least, it is better to leave them all under one name. *S. mœsites* is a close relative of the continental *telea* Hewitson (1873, Illustrations of Diurnal Lepidoptera. Lycænidæ, p. 143, pl. 57, figs. 350, 351 (not original description)), and is in all likelihood only subspecifically distinct.

Distribution. Cat Island (Arthurs Town, July 16, 1935, W. J. Clench). Florida and Cuba, and also Puerto Rico have been cited as localities for this species. It is found very likely in Hispaniola as well.

5. **Strymon columella columella** Fabr.

Papilio columella Fabricius, 1793, p. 282.
Tmolus salona: Sharpe, 1900, p. 200.
Strymon columella: Bates, 1935, p. 194, fig. 15.

Mexican specimens belong to a separate subspecies (*istapa* Reak.) according to Field (1939, p. 346).

Distribution. New Providence Island (Nassau, June 1897, C. J. Maynard; Feb. 1933, J. C. Greenway; Feb. 1, and Mar. 12, 1934, Armour Exp.); Southern Eleuthera Island (Feb. 1934, Armour Exp.); Conception Island (Feb. 12, 1934, Armour Exp.); Rum Cay (1934, Armour Exp.); Long Island (Clarence Town, Feb. 20, 1934, Armour Exp.; Simm's, July 16, 1936, H. D. Russell and R. A. McLean).

Typical *columella* is widely distributed throughout the West Indies and Florida.

6. **Strymon angelia dowi** Clench

Tmolus angelia: Sharpe, 1900, p. 200.
Strymon angelia dowi Clench, 1941, p. 4.

S. dowi is quite distinct from the Cuban race (typical *angelia*), having a lighter ground color, and nearly lacking the fulvous on the upperside of the secondaries in the male.

Distribution. New Providence Island (Nassau, June 1897, C. J. Maynard); Cat Island (Arthurs Town, July 14–16, 1935, W. J. Clench); Long Island (Simm's, July 7, 1936, H. D. Russell and R. A. McLean); Mariguana Island (Feb. 25, 1933, Armour Exp.). All types.

The typical form is found in Cuba, Puerto Rico and Jamaica. It will in all probability turn up in Hispaniola when that island is more thoroughly explored.

Genus **Hemiargus** Hübner

7. **Hemiargus hanno filenus** Poey

Polyommatus filenus Poey, 1832, no. 13, 3 figs.
Hemiargus filenus: Bates, 1935, p. 196, fig. 16.

Judging by the available data, *filenus*, in the Bahamas, is restricted to the more southerly islands. However, more extensive collecting may turn it up in the northern part of the group. It seems strange, nevertheless, that records of it are absent from New Providence Island, and Cat Island, the two islands most thoroughly known.

Distribution. Long Island (Clarence Town, Feb. 1934, Armour Exp.); Great Inagua Island (Feb. 1934, Armour Exp.).

Specimens from Florida, Cuba, Jamaica and Hispaniola seem to agree with those from the Bahamas, and together form the Antillean race of *hanno*.

8. **Hemiargus catilina thomasi** Clench

Hemiargus catilina thomasi Clench, 1941a, p. 407.

This race differs from the typical (Florida) form in the reduction and graying over of the white bands on both wings below.

Distribution. Cat Island (Arthurs Town, July 16, 1935, W. J. Clench; Russell's Creek, July 16, 1935, W. J. Clench);

Rum Cay (1934, Armour Exp.); Great Inagua Island (Feb. 1934, Armour Exp.).

9. **Hemiargus catilina ammon Lucas**

Lycæna ammon Lucas, 1857, p. 612, pl. 16, figs. 7, 7a, 7b.
Hemiargus ammon: Bates, 1935, p. 197.

This record is founded upon a single and very badly damaged specimen. Though positive examination is very difficult, it doesn't appear to differ from typical Cuban specimens.

Distribution. Long Island (Simm's, July 16, 1936, H. D. Russell and R. A. McLean).

This subspecies of *catilina* is found also in Hispaniola and Cuba.

10. **Hemiargus bahamensis**, new species

UPPERSIDE:

Male. Both wings blue. *Fore wing* with a thin black marginal border, faintly thicker at the apex. *Hind wing* with a single black spot between veins Cu_1-Cu_2, and a suggestion of another between Cu_2-2A. *Fringe* of both wings white, darker at the ends of the veins.

UNDERSIDE:

Male. Ground color uniform gray-brown. Markings characteristic of *catilina*, but hardly distinguishable, due to the darker ground color, and almost complete absence of the white which usually surrounds them. In addition, the three spots in the basal area of the hind wing, usually jet black, have here lightened to the color of the ground, and can hardly be distinguished from it. On the *fore wing* there is a submarginal line of white, rather thin, contrasting sharply with the dark gray-brown which surrounds it. On the *hind wing* there is a corresponding white line, slightly thicker, which runs from costa to inner margin, as does that of the fore wing. On the outer margin, near the anal angle, are two black spots, irrorated heavily with metallic blue green scales on their outer margins. The one in Cu_1-Cu_2 is capped by a thin curved line of orange, while the smaller one adjacent to it is capped by a similar line of white. *Length of fore wing* 9 mm.

Holotype, male, Crooked Island, Bahamas, March 1, 1934 (Armour Exp.), M.C.Z. 25737.

Remarks. This species belongs to the group in the genus *Hemiargus* that includes *catilina* Fabr., and its races, and *dominica* Möschl., though it is quite different from either. It bears a certain resemblance to *dominica* in the reduction in color of the basal spots, but there the similarity ceases. *H. dominica*, like *ammon*, is very light, with scattered brown markings, while *bahamensis* is dark, with the markings scarcely apparent. It is, perhaps, closest in appearance to *thomasi*, the Bahaman race of *catilina*. However, it can be distinguished readily by the pure white (though thin) lines, one on each wing, below, and in the reduced color of the basal spots, which are in *thomasi* jet black, as in the other *catilina* races. The reduction of the orange lunule below also seems characteristic of *bahamensis*.

Genus **Brephidium** Scudder

11. **Brephidium isophthalma** Herr.-Schäff.

Lycæna isophthalma Herrich-Schäffer, 1862, p. 141.
Brephidium isophthalma: Bates, 1935, p. 198.

Bahaman specimens seem to agree with those of Cuba.

Distribution. New Providence Island (Nassau, June 1897, C. J. Maynard).

12. **Brephidium barbouri**, new species

UPPERSIDE:

Male. *Fore wing* dark brown with a reddish discal tinge. Base of wing blue. *Hind wing* dark brown, with a basal blue area as in the fore wing, but more extensive. The veins in this blue area are obscurely pencilled with dark brown. A row of inconspicuous dark spots adorns the outer margin. *Fringe* of fore wing brown, faintly whitish towards apex; that of hind wing white.

UNDERSIDE:

Male. *Fore wing* with the base, outer margin and apex dark gray; disk ruddy brown. A submarginal row of white dashes parallels the outer margin. In the disk is an interrupted, badly dislocated, double white line, and a double dash at the end of the cell. *Hind wing* dark gray brown. Obscure white dashes and white scaling are scattered over the entire surface with the same general pattern as found in *isophthalma* and *exilis* Boisd. At the base is a narrow area of greenish scaling. There are seven spots on the outer margin, the anal one and apical two all metallic green, the remaining black, with a convex line of green irroration in each. Between these spots and the outer margin is a thin line of dull orange, which extends basally between the spots for a short distance. Basal to the row of spots is a faint and rather indefinite whitish line.

Holotype, male, Great Inagua Island, Bahamas, Feb. 1934 (Armour Exp.).

Paratype, male, same data.

Holotype and paratype, M.C.Z. no. 25738.

Remarks. This species differs from the related *isophthalma* and *exilis* in the absence of a white patch of fringe near the anal angle of the fore wing, and in a darker color below, especially on the fore wing. It also appears to be darker above. Two specimens from Rum Cay (Feb. 1934, Armour Exp.) seem referable to *barbouri*.

This species is named for Dr. Thomas Barbour, director of the Museum of Comparative Zoölogy.

Genus **Leptotes** Scudder

13. **Leptotes cassius theonus** Lucas

Lycæna theonus Lucas, 1857, p. 611, pl. 16, figs. 8, 8a, 8b.
Tarucus cassius: Sharpe, 1900, p. 199.
Leptotes theonus: Bates, 1935, p. 198.

Bahaman specimens agree with those found elsewhere in the West Indies and Florida.

Distribution. South Bimini Island (Alicetown, Apr. 1941, R. W. Foster and J. Huntington); New Providence Island (Nassau, June 1897, C. J. Maynard); Southern Eleuthera Island (Feb. 1934, Armour Exp.); Cat Island (Arthur's Town, Aug. 5, 1935, W. J. Clench); Stranger's Cay, Little Abaco Island (July 5, 1904, O. Bryant); Crooked Island (March 1, 1934, Armour Exp.); Great Inagua Island (Feb. 1934, Armour Exp.); Long Island (Clarence Town, July 29, 1936, W. J. Clench and J. C. Greenway); Grand Bahama Island (Eight Mile Rock, Apr. 22, 1936, W. J. Clench); Rum Cay (1934, Armour Exp.); Watling's Island (Feb. 17, 1933, J. C. Greenway).

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SOME NEW OR LITTLE KNOWN NEARCTIC NEONYMPHA[1]

(Lepidoptera: Satyridæ)

By V. Nabokov

The capture in Arizona in June 1941 of what struck me as an undescribed species of *Neonympha* suggested certain investigations, the results of which are given in this paper. A study of about a hundred specimens labelled "*henshawi* Edw.," which I accumulated from different sources, revealed that two pairs of gemmate species, one pair unnamed, the other neglected, occurred in Arizona. Confusion has been due not so much to some chance obscurity in a great entomologist's description 66 years ago, as to the indifference and consequent lack of precision in regard to this section of *Neonympha* on the part of those who wrote after him. Somehow lepidopterists have never seemed overeager to obtain these delicately ornamented, quickly fading Satyrids that so quaintly combine a boreal-alpine aspect with a tropical-silvan one, the upperside quiet velvet of "browns" being accompanied by an almost Lycænid glitter on the under surface. There exists very little information concerning such things as the number of broods, possible seasonal variation, limits of distribution, allied Mexican and Central American forms, haunts, habits and early stages.

What follows is an attempt to set down the peculiarities of these four insects as a tentative basis for further research that would amplify the comparatively meager facts at my disposal. A definition of the species most usually confused with *henshawi* Edw. and a full description of its typical race, with comparative descriptions of two other races are followed by comparative descriptions of the three other species, listing their distinctive characters in the same order. The species to be discussed are:

Neonympha dorothea n. sp. (referred to by Edwards as

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"some specimens" etc., in conjoint description of ***henshawi*** Edw., 1887, Butt. N. Am., III, *Neonympha* I; reproduced from a female in Edwards' collection as "***henshawi*** Edw., male," by Holland, 1898, and later editions, Butt. Book, Pl. 25, fig. 8, upperside.)

Neonympha maniola n. sp. (presumably figured, as "*henshawi*," by Wright, 1905, Butt. W. Coast, Pl. 25, fig. 226 a, b, c, male, upperside, female, both sides).

Neonympha pyracmon Butler (1866, Proc. Zool. Soc., London, p. 499, female; 1867, Proc. Zool. Soc., London, Pl. 11, fig. 11, female, underside; Godman, 1901, Biol. Centr. Am. Rhop., II, p. 658; III, Pl. 107, figs. 11, 12, male, both sides, mislabelled "*hilaria*"; Weymer, 1911, in Seitz, Rhop. Am., p. 223).

Neonympha henshawi Edwards (1876, Trans. Am. Ent. Soc., p. 205, female; Godman, 1880, Biol. Centr. Am., Rhop., III, Pl. 8, fig. 27, female, underside, mislabelled "*pyracmon*"; Edwards, 1887, Butt. N. Am., III, Pl. 1, figs. 5–8, both sexes, both sides; Maynard, 1891, Mnl. N. Am. Butt., p. 108, female; fig. 35d, female, hind-wing underside).

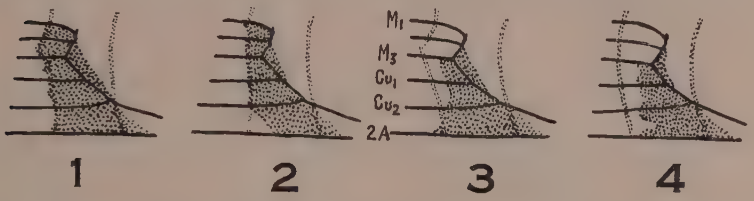
Neonympha dorothea n. sp.

Sharing with the other three species such upperside characters as: brownish ground color in male, with more or less diffuse fulvous red; fine fulvous margin, mainly subanal in secondaries; androconial mark in male primaries; præterminal dark spots in secondaries of both sexes; and such underside characters as: more or less fulvous ground color of primaries; small discal button-spot on both wings; four transverse lines, to wit: first discal, crossing cell R + M; second discal, curving round cell (its course in primaries dependent upon specific outline of termen); subterminal, mostly striate in primaries (less adjusted there to differentiation of termen) and mostly incomplete and deformed in secondaries; præterminal, mostly punctate in primaries, and embossed with serrate silver in secondaries where it forms a silver W in Cu_1, passes through two double ocelli in M_3 and M_2 placed within a cinereous irroration, and produces two pairs of V-shaped dashes in M_1 and R_s.

Distinguished from its three congeners as follows: Primaries apically short and rather bluntly rounded, with straight termen;

secondaries evenly rounded in both sexes, with very slight sinuation in female; præterminal spots rather blurred.

Androconial mark: medium sized, with fairly smooth outer edge coinciding, except in Cu_2 where it retreats basally, with second discal line as seen through wing; consisting of 5 patches (shading in 2A not included), adjoining cell and separated by veins, as follows: rhomboid, with sides slanting basally subparallel to cubitus, in Cu_2; two decreasing trapezoids, in Cu_1 and M_3; two wedges in M_2 and M_1; and of short triangle, in cell R + M, against inner side of cross vein, pointing basally and reaching down to about level of Cu_1. (See fig. 2.)



FIGS. 1–4. Scheme of androconial patches in Neonympha. 1, *N. maniola*; 2, *N. dorothea*; 3, *N. henshawi*; 4, *N. pyracmon*.

Female upperside: diffusely colored, with slight shadings.

Male and female underside: primaries: second discal line running subparallel to first discal line, curving from costa behind cell to slope down towards subterminal line and thus limiting with the latter a truncate upsilon-shaped area in middle of wing; subterminal line from dorsum up to about Cu_1 running closer to second discal than to termen but then, by retaining a primal course, diverging terminally to reach apex (which would have been costa, had the apex been longer, in which case the subterminal line would have been parallel to a primal, slanting, termen), thus enhancing the impression of the outward slope on the part of the second discal which in reality is subparallel to the straight termen (to which, contrary to the subterminal line, it has become adjusted); secondaries: heavily and completely bordered with dark cinereous which encloses ocelli and silver serration, and expands in M_2 and M_3 where the second discal line is thickly arched inversely to termen.

Neonympha dorothea dorothea n. subsp.

Male: expanse of left fore-wing 20.9 (from base to end of M_1). Upperside: deep brown with lighter veins; some dark fulvous red scales just discernible in between them; cilia fuscous; dark fuscous androconial mark. Primaries very finely edged with fulvous; secondaries more broadly so, but only to about Cu_1 from tornus, with four spots along termen: first one rather indistinct, in Cu_1; second and third subreniform, blotchy, blackish, in M_3 and M_2; and fourth, very weak, in M_1; a fine dark ray (interneural fold) through middle of each reaching the cilia from disc. Underside: primaries: flushed with deep warm red of Erebian ("*callias*") tone over lower part; thickly dusted with yellowish brown and traversed by reddish brown striæ over upper part; lines: chestnut brown; præterminal consisting of very indistinct sequence of dots; small brown discal spot above M_2 near cell R+ M on both wings, buttoning top of androconial mark in primaries (if viewed through wing). Secondaries: discally of darker shade of brown than subcostal and subapical areas of primaries; with some redder striæ and a sprinkling of fluffy hoary scales basally; discal lines: deep chestnut brown; the first irregularly crossing cell R + M; the second from tornus following serrated (on Cu_2) but fairly direct course up to Cu_1 beyond which it strongly thickens and arches inversely to termen in M_3–M_2, then narrows again, abruptly turns outward as if to end at M_1, just above a roughly V-shaped basally pointed combination of two silver præterminal dashes, but really swerves back again and up towards R_s in which interspace it is almost concealed by a second V-pair of silver dashes which seems superimposed. Subterminal line from tornus arches inversely to termen in Cu_2, dips terminally, then shoots up basally along middle of cell Cu_1 where it stops, forming a thickish chestnut brown bar which coincides with the terminal course of the interneural fold. A broad cinereous border heavily stippled with purplish black transverse striæ, merged with the cinereous underside of the fringe and limited inwardly by the arches of the second discal and subterminal lines, occupies the whole outer third (excepting a vineleaf-shaped, as viewed from base, fulvous brown space between second discal and subterminal lines in C_1–C_2), thus completely enclosing the ocelli and other markings to be mentioned. Examined in its action upon the discal and subterminal lines, it may be described as invading the termen from the tornus, with its inward edge causing the subterminal line to arch inversely to termen in Cu_2, then bursting through in Cu_1, diverting basally the broken end of the subterminal line and swelling strongly towards the second discal; beyond Cu_1 it pushes up even farther, touching (except for a few dusky scales in between) the second discal, which its pressure forces to arch in M_3–M_2, and then reaching the termination of R_s. This border, which produces a strong avian or "scaly" effect, encloses præterminally, in M_3 and M_2, two subreniform (twinned) ocelli, jet-black, each delicately rimmed and threaded through with light fulvous so as to form a capital "B" facing the termen, with the interneural folds faintly traced in a paler tint through the dark cinereous irroration; in each black cell of each "B" a bright silver "T" glitters, its stem projecting basally, its crossbar subparallel to the termen and neither stem nor bar touching the rim. The embossed silver of these four "T" marks is supplied by the breaking up of a silver line which starts from about Cu_2 (in continuation and sublimation of a vaguely discernible dark præterminal line from tornus); forms in Cu_1, upon the interneural ray and beneath the end of the subterminal line, a "W" (as viewed from base), where an ocellus, visible as a spot on the upperside, seems to be in the process of being built with the help of the dark pigment which is channelled terminally by the interneural fold from the end of the subterminal line; then traverses the kernels of the spots in M_3 and M_2 and produces farther up the V-shaped pairs of silver dashes already mentioned; the first pair of these suggests the formation of a rudimental fourth spot whose interneural ray looks like a terminal projection of the second discal line. There is a thin bright fulvous margin from tornus to middle of cell Cu_1, running between the cilia and the silver line (incidentally, in regard to these very *Coenonympha*-like markings, it should be noted that the ocelli in the latter genus are formed subterminally, not præterminally as in this section of *Neonympha*).

Female. Exp. 21.5. Upperside pale reddish brown with pinkish tone. Primaries: with faint adumbration post-cellularly and terminally, but on the whole producing a unicolorous impression. Secondaries: evenly rounded, as in male; with dim greyish shade surrounding the rather blurred and formless dark spots (in M_2, M_3 and Cu_1) and slightly deepening towards apex. Underside as in male.

Male, holotype, female, allotype, and two males, paratypes, placed in the American Museum of Natural History. Taken during a brief visit to Grand Cañon, Ariz., South Rim, on June 9th, 1941 (bright cold morning after snow and rain). They were weakly fluttering beside the trail together with a few *Coen. tullia furcae* — almost no other butterflies about. Named in honor of Miss Dorothy Leuthold who kindly kicked up the first specimen. Female, paratype, labelled "Grand Cy., June 11th '30", ex Coll. of C.F. dos Passos, Am. Mus. Nat. Hist.

Neonympha dorothea edwardsi n. subsp.

Male. Exp. 20.2. Upperside: brown tint somewhat lighter, with much greater amount of duller fulvous red diffused in both wings. Secondaries: spots reduced to two, in M_3 and M_2 (visible also in Cu_1 in some specimens). Underside: striæ somewhat more abundant and conspicuous on both wings. Primaries: pale fulvous brown with light reddish wash in lower part; præterminal line quite clear as a row of dots. Secondaries: fulvous brown; beyond second discal line correspondingly paler than in *dorothea dorothea*. Cinereous border somewhat less developed, i.e. not approaching as close to arched but slightly thinner second discal in M_3 and M_2, thus leaving a narrow but distinct stretch of ground color in between.

Female. Exp. 20.7. Upperside pale reddish brown but lacking the pinkish tone of *dorothea dorothea* — a slight but distinct character connecting it with transitions to the fulvous southern race or races.

Male, holotype, labelled: "Gila Co. Ariz. June 1902, O. C. Poling", ex A. G. Weeks Coll., Museum of Comparative Zoology, Cambridge, Mass.; female, allotype, "Ariz. 1892, C. J. Paine", Mus. Comp. Zool. Paratypes: 3 males "Gila Co. Ariz. June 1902, O. C. Poling", ex A. G. Weeks Coll., Mus. Comp. Zool.; 2 males and 1 female "Ariz. 1892, C. J. Paine", Mus. Comp. Zool.; male and female, from "Ariz^{a}", wrongly labelled "*Henshawi* M" in Edwards' hand, ex Edwards' Coll., Carnegie Museum (it is the female of this pair that Holland figures as "*henshawi* Edw., male" with the remark "much like *N. gemma*, but considerably larger and decidedly reddish upon the upperside"; 1 male "Water Cañon, N. Mex., 5,000 ft. August '81,

F. H. Snow" ex Edwards' Coll., Carn. Mus.; 1 male "Fort Wingate (N. Mex.), June '23, Marloff Coll.", Carn. Mus.; 2 males "Colorado" (one "Coll. Hy Edw."), 1 female "Colorado, Coll. Hy Edw.", Am. Mus. Nat. Hist.

(I should have preferred taking as holotype the male from Edwards' collection were it not for the awkwardness of having such a vague locality as "Ariz^{a}" for the type of a race.)

Neonympha dorothea avicula n. subsp.

Male. Exp. 17.6. Upperside: primaries, fuscous, less brown than *dorothea dorothea*, with the dark fuscous androconial shading standing out very clearly; two large bright fulvous red patches in Cu_1 and M_3 and a similar bright tint along the veins involved in this area. The fulvous is so conspicuous and the fuscous so vague (and so much lighter than the sexmark), that the eye is inclined to accept the former as ground color. Secondaries: somewhat darker than primaries with only a slight suggestion of fulvous red in disc and two indistinct præterminal spots in M_3 and M_2. Underside: ground color of both wings a dull dunnish brown, very different from the rich and contrasting shades in *dorothea dorothea*, and of a remarkably even appearance owing to the almost total lack of (brown) striæ, which are only faintly discernible about the costa and base of both wings. Primaries: lines very faint, with the first discal hardly differentiated from the striæ; but the discernible directions of the lines are naturally those of the species. Secondaries: first discal indistinct; second discal thickening and arching strongly, of a duller brown than in *dorothea dorothea* or *edwardsi*. Cinereous border as dark and rich as in typical race, but pressing against second discal in M_3–M_2 completely, without even the presence of a few dusky scales in between. Ocelli a trifle smaller than the smaller size of the insect might justify; silver serration and brown bar well developed; terminal fulvous line broader anally than in *dorothea dorothea*.

Female. Exp. 18.5. Upperside of a very *Cœnonympha*-like appearance stressed by small size and fulvous tone which slightly deepens in primaries in area corresponding to that limited by the discal lines beneath, but not showing any definite bands or lines, only a pale fuscous border merging with a similar shading along the costa. Secondaries: with a slight sinuation in termen unimpairing their "dorothean" roundness and correspondence to primaries; well shaded with greyish; light fulvous in disc and beyond that slightly irrorated with the trans-wing shadows of the heavily striated cinereous border beneath. Underside: rather more contrasty than in male. Primaries: yellowish with faint fulvous red flush over lower part; marked as in male. Secondaries: as in male except for a slight olivaceous brown deepening of the dull ground color.

Male, holotype, female, allotype, and female, paratype, all three labelled "Fort Davis, Texas, 3.VI.40", female, paratype, exp. 20.5, same label, with the addition "6,500 f.". All these ex Coll. C. F. dos Passos, Am. Mus. Nat. Hist.

The fixation of these three definite racial points, *dorothea dorothea, dorothea edwardsi* and *dorothea avicula* is, I think, unavoidable, but one does not care to indulge in pursuing this course and giving names to the various transitions which occur between them, especially as some of these variations seem to be seasonal. It will be noted that the holotypes of all three races were taken in June. Fifteen smallish specimens, twelve males, three females (Carn. Mus.), from Paradise, Ariz. taken by Poling late in the season (August-October) represent a certain transition from *edwardsi* to *avicula*; another kind of transition between the same is represented by two males from Silver City, South New Mexico, ex coll. dos Passos, Am. Mus. Nat. Hist.

Neonympha maniola n. sp.

Male. Primaries: more elongated apically than in *dorothea* with slightly slanting termen; in color like *dorothea edwardsi* with similar diffuse fulvous red. Secondaries: termen slightly sinuate; distinct præterminal spots, in Cu_1 (small), M_3 and M_2 (only the last two in most specimens), rather broadly aureolated with diffuse pale fulvous unlike any *dorothea* race.

Androconial mark: large, broader throughout than in *dorothea*, with larger, differently shaped patches and slightly jagged outer edge projecting on veins and interneural folds; postcellularly pushing against second discal as seen through the wing; consisting of 5 patches: broad trapezoid, in C_2; two slightly decreasing trapezoids, in Cu_1 and M_3; two wedges in M_2 and M_1; and of a triangle, in cell R + M, twice as long as in *dorothea*, pointing basally and reaching down to about level of Cu_2. (See fig. 1.)

Male underside: primaries: rather bright fulvous of a uniform tint (in some specimens the lines are almost erased), only slightly yellower along costa and subapically, and very weakly striated; second discal, in correspondence to termen, after sloping terminally from costa turning basally in middle of cell M_2, then sloping downwards towards first discal line, subparallel here to subterminal line which starts from dorsum slightly closer to termen than to second discal and further up slopes apically though rather less so than in *dorothea*. Secondaries: producing in contrast with brightly and evenly fulvous primaries a curious "Manioloid" or "Hipparchian" effect, being thickly dusted all over (even between second discal and subterminal in some specimens) with greyish scales and abundant dusky striæ over a dull brownish ground. Cinereous border reduced to a suboval patch in middle of outer third, weakly pigmented (in some specimens scarcely noticeable amid the general suffusion, although essentially of a different, probably cilian, origin, tint and texture than the dull grey, probably basally originated, scales over the rest of the wing); this patch not as finely or evenly striated as in *dorothea*, the striæ not much darker or less brown than in the rest of the wing, and surrounded completely and cloudily by the ground color with a yellower glimpse of same also visible within, around the ocelli, as a diffusion or germination of their rims. Second discal line of the *dorothea* type but more vaguely deviated basally in M_3–M_2, owing to weaker development of cinereous irroration; less abruptly projecting outwards in M_1 and clearer in R_s, but producing the same impression of passing underneath the second pair of silver dashes as in *dorothea* and thus not connecting with the second discal of primaries; bar of subterminal very weak.

Male, exp. 20.5, holotype, "Cochise Co., ex Coll. A. G. Weeks, slide 454", Mus. Comp. Zool.; paratypes: 2 males, labelled "Chiricahua Mts., (one: 7.VI.08, V. L. Clemense), ex Coll. H. C. Fall", Mus. Comp. Zool; 2 males "Chiricahua Mts. (22.VI.33, D. K. Dunkan; 25.VI)", ex coll. C. F. dos Passos, Am. Mus. Nat. Hist.

This, I think, is the "*henshawi*" figured by Wright who gives color photograph of male and female upperside and female underside (folded) from specimens taken in Sta Rita Mts., Pima Co. with the remark: "It can scarcely be considered as belonging to the West Coast fauna and has but little, if any interest for us." The female figure is only slightly differentiated from the male, with primaries upperside fulvous red, diffusely bordered with fuscous, and secondaries evenly fuscous with the fulvous aureoles of the male merely enlarged and deepened in tint to form an interrupted lunulate belt; underside (with allowance for a greenish blurring of the color process in the figure) very similar to the Chiricahua males.

I have felt somewhat reluctant to fix this as a species, as there are no females in any of the collections I have examined. *Maniola* is closely allied to *dorothea*; but granted that androconial mark, wing shape, behavior of second discal and subterminal lines, and certain peculiarities of scaling, such as disclosed by the cinereous irroration, constitute specific characters in this group (if they do not, then one arrives at the absurd conclusion that there is only one "good" species, *gemma* Hübner, with ab. *pyracmon*, ab. *henshawi*, ab. *maniola*, ab. *dorothea* etc. not even as races, for they occur together in different combinations) I cannot very well see how *maniola* can be placed alongside the *dorothea* races described, which all have a system of common characters quite inapplicable to *maniola*.

The third species, *pyracmon* Butl., is newly added here to the fauna of North America, although for many years specimens, labelled "henshawi" in collections, have been coming from Arizona. The Biol. Centr. Am. figure of "*Pyracmon*" female underside, totally different from Butler's figure, refers obviously to a form of *henshawi*, while the beautifully executed portrait of *pyracmon* male, with underside, is designated as "*hilaria*" (an error corrected in the text). Butler's figure of the underside is coarsely colored, being, with the other butterflies on the plate, too dusky and though illustrating, as it purports to do, a female, produces a wrong impression, simulating a male. Thus, *pyracmon* is pretty well concealed from the collector. However, a careful examination of Butler's text and figure convinces me that the Biol. Centr. Am. does illustrate the male of Butler's species, and with this figure the Arizonian insect tallies nicely. Unfortunately, I have not been able to obtain Mexican specimens or to get a photograph of the type from England.

Butler's original description, in Victorian Latin, runs thus:

"Euptychia Pyracmon, sp. n. female. Alæ supra fuscæ, linea post alarum medium posita fusca, extus rubro marginata, anticarum subintegra, posticarum lunulata: anticæ margine postico paulo fuscescente, ciliis cinereis: posticæ margine apicale paulo fuscescente, margine anali rufescente, maculis tribus (or two. V. N.) submarginalibus nigris, interna minima: corpus cinereofuscum; antennis supra fuscis, subtus albidis, præ flavescentibus, cinereo fasciolatus. Alæ subtus ochreæ cinereo variæ, fasciis duabus mediis irregularibus ferrugineis: anticæ linea submarginali undulata apicem non attingente (this character cannot be constant. V. N.): posticæ linea submarginali lunulata argintea, apud marginem analem intus ferrugineo marginata, ad apicem maculas duas binas argenteas formante, maculis duabus mediis marginalibus nigris, macula permagna subanali cinerascente: corpus ochreo cinereum. Exp. alar. unc. 1 14/16. Hab. Oajaca (Mexico). B. M.

Closely allied to *E. gemma* from which it differs in being much larger, having the apex of the fron wings subangulated and the outer margin of the hind wings sinuated; the wings above reddish in some parts, with much larger marginal black spots; below the central streaks are more distinct, reddish and different in outline."

The last distinction is a mistake, *gemma* showing the same peculiar serrate projections of the second discal, secondaries underside (a character carried to a still further extent in the closely allied *pephredo* Godman [1901, Biol. Centr. Am. Rhop., II, p. 657; III, pl. 8, fig. 12, mislabelled "gemma"] which thus stands towards *hilaria* Godman [1901, Biol. Centr. Am., II, p. 658] in the same way as *pyracmon* does towards *henshawi*); otherwise the description is reasonably clear and has been repeated in a condensed form 45 years later by Weymer who alludes to the male too — at least I think he does, because of two details, the "reddish" aureoles in secondaries upperside, and the "dentate" lines in secondaries underside; but his reference to the sexmark as being "large" is extremely unfortunate (though in keeping with the general mess Weymer makes of the *Neonympha*).

Pyracmon from a North American pair may be described thus:

Neonympha pyracmon Butl.

Primaries: with full evenly rounded termen; secondaries: termen sinuate, with slight projection on Cu_1 in both sexes, but the wing comparatively small and round (i.e. not as developed as in the next species).

Male upperside: velvety brown, i.e. of a smoother and lighter color than *maniola* or *dorothea*, with dull cinereous, instead of fuscous, cilia. Secondaries: second discal visible as a wavy dark fuscous line margined outwardly with fulvous red; præterminal spots rimmed with the same bright hue (very different from the pale aureoles of *maniola*); clot of similar fulvous red tint above Cu_2, corresponding to triangular diffusion of subterminal bar beneath.

Androconial mark: short and narrow, much smaller than in *dorothea*, with deeply sinuate outer edge, its crests traversed by the veins; only just reaching second discal at these points; consisting of three patches (in Cu_2, Cu_1 and M_3) decreasing upwards, roughly trapezoid in shape but with outer sides deeply scooped; and of a very slight crescent (instead of triangle) in cell R + M with its convexity against cross vein and reaching down to about level of Cu_1. (See fig. 4.)

Female upperside: less differentiated from male than in *dorothea*, with similar to male but broader red rims, red blot and red margin to wavy second discal on warm brownish ground in secondaries; primaries with distinct reddish second discal.

Male and female, underside: both wings smooth greyish ochreous with a suggestion of olivaceous and very sparse striæ. Primaries: lines running subparallel to each other and termen; all three comparatively thick, of a clear fulvous red on both wings; præterminal dots blended into a continuous fulvous red line. Secondaries: lines, especially second discal, extraordinarily developed, continuous, broad, clearly displaying their mellow fulvous red tint; second discal so strongly toothed outwardly in its bold course (essentially of a different, direct, type than in *dorothea* or *maniola* where its outward deviation in M_1 causes the eye to miss its connection with the second discal of primaries) up to costa, where it connects with the second discal of primaries, that it interferes with the marginal markings as it projects terminally along veins Cu_2, Cu_1, M_2,

M_1 and R_s as if attracted by the metal of the præterminal serration; on Cu_2 its projection practically unites with the swerve of the subterminal line, thus forming a kind of roof over the W of the silver line, the bar being transformed here into a fulvous red triangular blot. The palish cinereous patch with a fulvous red diffusion of the aureoles, is in contact with the second discal because of the latter's development terminally, not because of its own basally as it is in *dorothea*; it is weakly dusted rather than striated with dark scales and produces a smoother, slightly opalescent effect due perhaps to the proximity of the florid second discal line.

Male, exp. 19.8, plesiotype, "Palmerlæ, Cochise Co., July '05" Am. Mus. Nat. Hist.

Other specimens: male and female (exp. 19.6) "Globe, Gila Co., Sept. 11", ex Coll. C. F. dos Passos, Am. Mus. Nat. Hist.; male "Paradize, Ariz., Poling", Carn. Mus.; male "C. J. Paine Coll.", Mus. Comp. Zool.; male "Cochise Co." ex Coll. W. C. Wood, Am. Mus. Nat. Hist.

It remains to tackle the fourth species. In 1876 W. H. Edwards, working, it may be assumed, in a bad light (note the "plumbaginous"), thus described a new "Euptychia":

"Euptychia henshawi, n. sp. male. Exp. 1.5 inch. Upperside light fuscous, immaculate. Underside of primaries russet, deepest along inner margin, brownish towards costa; crossed by four wavy ferruginous lines, one of which is parallel to the hind margin, midway between cell and margin, one just beyond cell and curving around it to costa, the third crosses middle of cell and the fourth is a demi-line ending at median nervure; there are also four transverse streaks near base of wing. Secondaries grey-brown, slightly russet tinted, crossed by two ferruginous lines, the outer one irregular, wavy towards margin, shaded on its inner side; the outer, near base, rather zigzag than wavy; some fine streaks on basal area; the hind margin ashy brown streaked with dark ferruginous; showing four black eyelets, small, equal, placed near the edge of the wing, in pairs on the upper median and next upper interspaces, each with a plumbaginous streak across the marginal side and through the middle, but not reaching quite across; irregular streaks or slight patches of dull silver in the interspaces both towards outer and inner angle; the margin next inner angle edged with ferruginous. Body above fuscous, beneath gray, the abdomen buff, legs gray; palpi gray with black hair in front; antennæ fuscous, imperfectly annulated with whitish; club fuscous above, russet below.

"Female. Exp. 1.7 inch. Both wings russet in disc, primaries most brightly. The margins fuscous as is also costal edge of primaries; on secondaries the eyelets of underside are indicated by small dark fuscous spots. Underside as in male.

"From Arizona and New Mexico, collected in 1874 by H. W. Henshaw of the Wheeler expedition in honor of whom I name the species, and in 1875 by Lieut. W. C. Carpenter."

The description of the male is worthless for all purposes of determination and I have ignored it in my bibliographical summary. A light fuscous Neonympha expanding 1.5 inch with no markings, red flush or androconial brand might be, for all one knows, an oversized *gemma* — although on the other hand it is possible to argue that the describer was merely in a hurry to get to the interesting underside. The "demi-line" obviously refers to some chance sequence of striæ (and what is further left without comment fits at least seven species of *Neonympha*). Size, ground color of underside and description of lines in secondaries underside apply perhaps better to *dorothea edwardsi* than to the species which I hold to be the true *henshawi* Edw. The words "New Mexico", where *henshawi* is not yet known to occur, suggest that there were some specimens of *edwardsi* (not however the one taken, much later, by Snow) among the series Edwards was examining as he wrote. On the other hand, the description of the lines in primaries upperside and of the cinereous scaling in secondaries underside does not fit *edwardsi* (or any race of *dorothea*) at all: it exactly fits *henshawi*. In fact, if this male were a hybrid between the two, with moreover a strain of *gemma*, it could not have been better described. Such a freak being unlikely, I am forced to dismiss this confused and composite picture altogether as not applying to any known insect.

The description of the female however is that of a fairly recognisable *henshawi* (a form of which was figured as *pyracmon* by Godman four years later) differing from the female of *dorothea* in the two main details cited: "russet in the disc, primaries most brightly" and "small dark fuscous spots" which in *dorothea* are comparatively large and dim. As the tint which Edwards calls "russet" seems to be on the yellow, rather than on the red side (for example, the costal yellowish brown of the primaries underside in *dorothea* or the ground color upperside in female *avicula*), "russet" cannot apply to the pale reddish female of *dorothea edwardsi*, a specimen of which Edwards had. "Underside as in male" merely suggests that when Edwards picked up the fresher female of the two he possessed, a *henshawi*, the general impression he had formed from the inspection of his mixed males was based less on his specimens of *dorothea*, than on those of *henshawi*. But again, the back of an entomologist's mind is not a very sound basis for the deciphering of his descriptions, and so a further accumulation of clues is necessary.

In 1887, 11 years later, Edwards, in one of the finest works on butterflies ever published, gave a lovely plate illustrating his species, the models being a male and female from his collection. These are before me as I write and are not *dorothea edwardsi*. Except that the termen in the female is perhaps not sinuated enough, these figures are admirable. The accompanying description, which is far superior to the original one, will be examined presently. Edwards adds that the resemblance of his species to *gemma* is close in regard to the markings, and describes the egg which Doll sent him from Arizona in 1881, but which did not hatch (thus leaving us in doubt as to which of four possible species laid the dome-shaped turquoise blue ovum Edwards figures). In 1891, Charles J. Maynard described *N. henshawi* Edw. ("Henshaw's Quaker") as follows: "About the size of the type *N. euritris*, but is more reddish or rusty above, a dark band crosses middle of both wings, and there are two black dots in middle of outer border. Beneath finely marked with minute lines between the common bands. On outer portion of fore wings there is a wavy band but no spots. In the middle of hind wing is a whitish space containing four dots in pairs, each with a silver center. Above and below these are silver markings." There is not a shadow of doubt that this blunt description refers to the species (though not to the same specimen) that Edwards figured, and the humble woodcut Maynard gives of the underside of a female right hind wing represents that species quite unmistakably — which is a highly important moment in the nomenclatorial history of this unfortunate butterfly, and which would have prevented me, if nothing else did, from switching the name *henshawi* to the species *dorothea* had I wished to retain the more familiar name for a butterfly which appears to be more widely distributed this side of the border. Godman's mention of "*henshawi*" (II, p. 658) may as well refer to *dorothea*; Weymer's description of "*henshawi*" in what Holland politely calls a "monograph" of the *Neonympha* is much too slapdash and muddled to be taken into any account at all.

But to return to Edwards' description in Butt. N. Am.:

"Male. Exp. 1.5 inch. Upperside dark brown, often with russet over the extra-discal areas of both wings; some examples have an ill defined patch of russet on the median interspaces of primaries, and there is usually a russet edging to hind margin secondaries next anal angle; on the middle of same margin two small black spots not always present; fringes dark grey. Underside either brown or russet, thickly dusted with yellow-white scales, more yellow beyond the discal band of secondaries; the whole surface finely streaked and dotted with red brown; primaries crossed by three wavy red brown lines, two of which enclose the discal band, the other lying nearly midway between the band and margin, often macular; some examples have a demi-line crossing cell to median; the discal lines are continued across secondaries, the outer one often projecting roundly on second subcostal nervule; a short sinuous line an anal angle; on middle of hind margin a large suboval patch, the ground of which is dark brown, sprinkled with whitish scales; within this, in upper median and discoidal interspaces, a pair of velvet black spots, each with an inverted "T" shaped patch of silver; in the interspaces towards outer angle a pair of silver dashes each, and in lower median a silver serration, and a bar in submedian. Body above dark brown, beneath grey brown; legs same; palpi grey with many black hairs; antennæ blackish, annulated with light; club black above, ferruginous at tip and beneath.

"Female. Exp. 1.7 inch.; russet, brown about the margin; spots on secondaries as in male. Underside of primaries russet, of secondaries yellow brown; marked like the male.

"New Mexico, Arizona, Colorado. First taken by H. W. Henshaw of the Wheeler Exploring Expedition, 1874. Morrisson afterwards brought examples from Arizona and B. Neumoegen from Oak Creek Canon, Colorado."

It is evident that here again Edwards had a series of mixed specimens before him. Only the Arizona ones, and not all of them, were *henshawi.* The "patch of russet" coming directly after the "russet" of the first line is not mere repetition, but seems to imply the difference that Edwards might have noticed between Henshaw's specimens with diffuse fulvous and a fulvous patched New Mexican race of *dorothea.* The "not always present" is less an excuse for the "immaculate" of the original description than an impression produced by the contrast between the distinct spots of *henshawi* and the rather dim blotches of *dorothea.* The abundantly streaked yellow underside is *henshawi* all over; so is the continuation of the lines from primaries across secondaries. The "often roundly projecting" refers to specimens of *dorothea.* The "suboval patch" is again *henshawi.* The original description of the female has been slightly revised as Edwards was evidently puzzled at having such different specimens of females. But taken all in all, I think we can distinguish here, through the fade-out of *dorothea*, an elegant and correct delineation of both sexes of the species which in 1887 corresponded to Edwards' final concept of his *henshawi*, the butterfly figured.

An examination of the eight specimens which are labelled, I understand, by Edwards himself, and come from his collection (now in the Carnegie Museum) reveals that five of these are *dorothea edwardsi* while the other three (two males and one female) represent the insect which I here definitely fix as *Neonympha henshawi.* There is no doubt in my mind that the female belongs to the same colony as the two males, and there is a reasonable amount of probability that it is the exact specimen of the original description which in the corresponding passage conveys rather neatly the general impression produced by this remarkably well conserved female. This noted, the following summary of distinctive characters will settle the identity of *N. henshawi.*

Neonympha henshawi Edw.

Typical race: primaries: roughly elongated apically, with slightly concave (fuller in female) slanting termen; secondaries: terminally sinuate, more so in female where they are very developed, with a projection (in some almost caudal) in termen on Cu_1; tornus angulate in both sexes. Upperside: cilia dull cinereous as in *pyracmon.* Male: of a smooth brown tint rather as in *pyracmon*. Primaries: with a cloud of dull fulvous discally (presumably less evident in fresh specimens); M_3 and lower corner of cell R + M outlined in same. Secondaries: with two præterminal spots, very distinct, small, oval, unrimmed; dimly discernible second discal line which is dark fuscous, tinged outwardly with diffuse dull fulvous.

Androconial mark: resembling that of *pyracmon*, but more expanded (conspicuously so in faded specimens) towards dorsum; consisting of three patches: large rhomboid with concave outer edge in Cu_2; a much narrower one in Cu_1, slightly concave outwardly; smallish patch in M_3; and of a crescent rather tending to a triangle but still retaining *pyracmon*'s character, although larger and reaching down in cell R + M to somewhat beyond the level of Cu_1. (See fig. 3.)

Female upperside: primaries rather bright tawny fulvous in disc, otherwise fulvous brown inclining to fuscous towards base and terminally; second discal brownish, distinct; first discal suffused with the brownish shading (but distinct in all other specimens I have examined which thus look more definitely banded than the only female of the typical race). Secondaries: fulvous in disc, fuscous basally, with a fuscous border in which the fulvous aureoles of the two distinct black small oval præterminal spots are broadened basally, and fuse to form an inner band.

Male and female underside: ground color similar on both wings (except for a space between second discal and subterminal in secondaries where it is lighter), of *pyracmon* type, but rather drabber, more yellowish, and regularly striated with browner striæ (except in said space). Primaries: second discal, corresponding to termen, angularly curving around cell R + M from costa (less angularly in some females where it thus resembles *pyracmon*), then sloping towards first discal with its concavity outward, subparallel here to subterminal which runs midway between second discal and termen, all through subparallel to termen, to reach costa. Secondaries: second discal tending, especially in female, to be straight (cp. the primal straightness of its course in *pyracmon* despite the dentations), and distinctly passing in front of the upper V-mark to connect with second discal line of primaries. Cinereous irroration reduced to small weak suboval patch in middle of outer third, speckled rather than striated with darker (dull brownish) scales; completely surrounded by ground color, with broadish yellowish brown diffusion of aureoles within. Subterminal line thin and only slightly curved in Cu_2 with very slight or diffused bar (invisible in most females) not interrupting the line which is thus perceptibly continued up as a slight inner margin of patch (very clear and straight in some females).

Female, lectotype, exp. 21.3, and male, paratype, exp. 20.4, labelled in Edwards' hand, "Henshawi M., Ariz^{a}," Carn. Mus. Paratypes: male with same label, Carn. Mus.; two males, no locality, ex Holl. Coll., Carn. Mus.

None of the following specimens examined belong to the type race, and the females fit in especially well with Maynard's description and figured outline: one male, exp. 20.5, "Arizoña", ex Coll. C. F. dos Passos; Am. Mus. Nat. Hist.; three females (one exp. 22.9) "So Ariz., O. C. Polling, ex Coll. A. G. Weeks," Mus. Comp. Zool.; one female "Chiricahua Mts., D. K. Dunkan, 24.VI.33", ex Coll. C. F. dos Passos, Am. Mus. Nat. Hist.; one female, "Cochise Co., ex Coll. W. C. Wood," Am. Mus. Nat. Hist.

Two males from Pima Co., "Mud Springs, Santa Catalina, 6.500 f. 17–20.VII.16", Am. Mus. Nat. Hist., and a female, "Cochise Co., C. J. Paine", Mus. Comp. Zool., offer some curious "pyracmonoid" characters. One of these males (exp. 18.7) has a slight rusty broadening of the second discal line in secondaries underside, which thus seems to run closer to the cinereous patch than in typical *henshawi*. The other male and the female show a definite rusty diffusion of this line near costa and another projection where it tends to unite with a rusty (though less red than in *pyracmon*) blot above the silver W.

Two males with Edwards' labels in pencil "*Henshawi* M. Ariz^{a}" ex Coll. Holland, Carn. Mus., obviously represent a definite race. There is more dull fulvous red spread over the primaries, so that these might be described as of that color, with dark fuscous sexmark traversed by fulvous veins, and rather pale fuscous shadings terminally and subcostally; second discal line in secondaries broadly margined discally with warm reddish fulvous; aureoles of the same tint. Underside curiously resembling *hilaria* (especially in one of the two specimens) owing to the transverse spaces between the lines being alternately darker and lighter, and rather brightly yellowish between the second discal and subterminal lines of both wings. Six females (2 females "Arizona E. G. Graham Acc. 8157. St. Rita Mts., 5.VII.27", Carn. Mus., 1 female, same region, same collection, "Florida Camp 8.VII.27", Carn. Mus., and 3 females "Huachuca Mts., 6.800 f., 21, 23, 23,VI.36", ex Coll. C. F. dos Passos, Am. Mus. Nat. Hist.), belonging, I think, to the same form as the variegated males, may be described as: fuscous with contrasting warm reddish bands and margins to lines, and with underside very like Godman's figure.

A few words may be added concerning the male armature of the four species under consideration. In *dorothea* the uncus looks straighter and the clasp broader (more arched dorsally and fuller ventrally) than in *maniola*, *pyracmon* or *henshawi*. I do not perceive much difference between the organs *pyracmon* and *henshawi*, except perhaps a slightly thinner uncus in the latter. Of the four species, *maniola* seems to have the narrowest clasp (concave ventrally, with elongated spur). Partly because several superficial characters proved sufficient to easily separate the four species, and partly because the number of specimens representing each was not compatible with a long series of dissection, the examination of the male armature was limited to half a dozen preparations, two of which were made for me by Mr. W. P. Comstock at the American Museum of Natural History. For the genitalia of *maniola* I used a slide prepared in 1934 by Dr. Marson Bates. Judging by the fact that he prepared a slide of *dorothea* too, it seems fair to suppose that he had noticed the difference between these two insects long before I did. Further study might reveal whether the shape of the clasps is constant (it was identical in 3 specimens of *dorothea*), or, if not, what is the specific scope of its variation.

In conclusion, my thanks are due to Mr. W. P. Comstock of the American Museum of Natural History for his invariable assistance and advice, and for the loan of their material; to Mr. C. F. dos Passos for loaning me his specimens; to Prof. Nathan Banks for placing at my disposal the series of the Museum of Comparative Zoology; to Dr. C. T. Parsons of that institution for assisting me in several matters; to Dr. A. Avinoff and Dr. W. R. Sweadner of the Carnegie Museum who not only patiently answered my queries concerning the Edwards series, but did me the exceptional favor of sending me all the "*henshawi*" material of the Carnegie Museum.

BEE–KILLING ASILIDS IN NEW ENGLAND

By Stanley W. Bromley

Bartlett Tree Research Laboratories,
Stamford, Connecticut

While Robber flies have been reported as destructive to honey-bees in Nebraska, Missouri, Texas, Florida and other Southern States, no species has been noted as of economic importance in this respect in New England.

In my observations on the prey of Robber flies in south-central Massachusetts as reported in Psyche, December 1914, p. 192, I mentioned that I had not observed Asilids feeding to any extent on honey-bees, although I listed certain species such as *Proctacanthus philadelphicus* Macq. and *Diogmites* (*Deromyia*) *umbrinus* Loew as partial to worker vespids.

A few years later, however, a situation came to my attention where Asilids were attacking bees extensively. This observation is here published for the first time. The species concerned was *Promachus fitchii* O. S. the famous old "Nebraska bee-killer" whose habits were first described by Fitch in his New York report of 1864.

About a mile and a half south of Southbridge, Massachusetts, lies a large drumlin called Lebanon Hill. Part way up the hill was an apiary of 15 or 20 hives. Adjacent to the bee yard were several dry hayfields which, although mowed yearly, were reaching a condition described as "run-out" by the farmers, because the better grasses were beginning to give way to such plants as ox-eye daisy, sorrel and black-eyed susan; a condition very probably due to white grub infestations. The dominants were, however, still timothy, red-top and some scattered clover.

These hayfields were fairly seething with *Promachus fitchii* and I soon saw that the majority of prey taken by them consisted of worker honey-bees. On July 10–13 (1915) and July 15 (1916) I collected 42 of these flies, both males and females, each with a honey-bee as prey. This represented in all about three hours collecting.

A summary of the records I have collected of honey-bees falling victims to Asilids in New England between 1911 and 1941 follows. These observations were made largely at Southbridge, Massachusetts; Wallingford and Stamford, Connecticut; and nearby areas.

Asilid species	Number of instances of honey-bee prey
Promachus fitchii O. S.	56
Diogmites umbrinus Loew	40
Proctacanthus philadelphicus Macq.	22
Proctacanthus rufus Williston	14
Promachus bastardii Macq.	11
Diogmites discolor Loew	7
Bombomima thoracica Fabr.	2
Bombomima grossa Fabr.	1
Bombomima flavicollis Say	1
Proctacanthus brevipennis Wied.	1
Erax æstuans L.	1

Of these 11 species, *Diogmites discolor* is restricted to the extreme southwest corner of Connecticut, *Proctacanthus rufus* to certain sand plains or washouts along some of the larger streams and rivers, *Bombomima grossa* is decidedly uncommon, and *Proctacanthus brevipennis* is found almost exclusively in level sandy open woods. The remainder are widespread and locally abundant. *Erax æstuans* is probably the most abundant and generally distributed of Southern New England Robber flies.

C. W. Johnson's list of N. E. Diptera (1925) recorded 86 species of Asilidæ in New England. Of this number it may be seen that only 11 species ordinarily kill honey-bees and of these only 3 or 4 at most may kill bees in any quantities. Even with the leading species on the list, *Promachus fitchii*, it would be very rarely that the effect of bee-killing by this insect on a commercial apiary would be felt.

In fact, it would seem quite probable that any possible loss which *P. fitchii* might occasion to bee-keepers would be more than counterbalanced by the control of *Phyllophaga* grubs exerted by the larvæ of this fly. Such benefits, however, would be much less apparent now than thirty years ago due to the decline in the utilization of grass for hay and the abandonment of mowing in many parts of New England as a result of the displacement of the horse by motor driven vehicles.

Promachus fitchii tends to disappear from hayfields after they have been abandoned and an old-field succession of varying stages from grasses to shrubs and trees takes place. So after all, the species begins to lose any significance it might have had as a bee-killer thirty years ago, with the changing times and conditions of more recent years.

NEW SPECIES OF SYRPHIDÆ FROM THE NEOTROPICAL REGION[1]

By Frank M. Hull

University of Mississippi

The present study is largely based upon flies in the Museum of Comparative Zoology at Cambridge, and is a continuation of earlier studies made upon these collections through the courtesy of Professor Nathan Banks. Types unless otherwise specified are in the collections of the Museum. Some paratypes are in the author's collection.

Eristalis bequaerti n. sp.

Characterized by the median pair of thoracic vittæ, fused on the posterior half, the pattern and yellow post margins of the abdominal segments. Related to *texanus* Hull.

Male. Length 8 mm. *Head:* the eyes are thickly brown pilose, the front and face black, the sides of both densely whitish pubescent and becoming brownish pubescent towards the middle of the front; a somewhat triangular area in front of the antennæ is left brown to black and bare. The pile through the whole middle of the front is black; on the sides and face white and abundant. Cheeks shining black. The vertical and upper occipital pile is black, the antennæ are dark brownish-black, the arista bare, the eyes touch for a short distance. *Thorax:* the mesonotum is opaque grey, bluish on an area behind the humeri and faintly brownish-grey on the remainder and with four black velvet vittæ. The medial pair coalesces just behind the suture and proceeds singly to the scutellum. Scutellum opaque bluish-black pollinose, the center and apex obscurely light brown. The pile of the whole pleura and broadly across the front of mesonotum is whitish. The notapleural pile and that upon the posterior half of the mesonotum is black.

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[1] Published with the aid of a grant from the Museum of Comparative Zoölogy of Harvard College.

Scutellar pile, except for sides and ventral fringe black. *Abdomen:* velvet black marked as follows: a brownish-black shining widely separated transverse central fascia upon the second segment, expanded a little laterally, a more slender, unbroken, shining black fascia across the middle of the third and fourth segments. The posterior margins of second to fourth segments are broadly opaque yellow. Abdominal pile short, dense, mostly erect and whitish to yellow. *Legs:* femora shining blackish, the hind pair considerably thickened in the middle, the tibiæ brownish-black, the basal third of the first pair and a little more than a third of the second pair brownish-yellow; the base of the hind pair is very dark brown. The first three tarsal joints of anterior and middle tarsi are light yellowish-brown; basal three joints of hind tarsi dark brown; remaining tarsal joints black. *Wings:* hyaline and bare, the stigma narrow and dark brown.

Holotype: a male. Villarica, Paraguay, October, F. Schade collector. One paratype, same data. I take pleasure in naming this for Dr. Joseph Bequaert.

Eristalis glabella n. sp.

Related to *fuliginosus* Hull, the arista is largely whitish, the scutellar cuneate spot is differently shaped and the third abdominal segment is almost wholly shining, besides less dense pile upon scutellum and mesonotum.

Female. Length 10 mm. *Head:* the front is shining black with an opaque, eye-marginal, elongate spot on the upper part of the front from the lower end of which a linear band of white pubescence margins the eyes all the way to the cheeks. Face and cheeks shining black, the sides of the former broadly white pubescent and sparse white pilose. The pile of the front and vertex is black with some white pile upon the lower part. Antennæ brown, the third joint oval and rounded apically; the arista bare, pale yellow at base and whitish on practically its whole length. *Thorax:* subopaque black, shining in front of the scutellum and sides of the post calli. The suture is linearly margined anteriorly with whitish pubescence; the humeri is margined anterio-medially with brown pollen and there is a pair of medial, obscure, brown pollinose stripes on the anterior part of the mesonotum. Scutellum opaque black and brown pollinose in an oblique light; it is sparsely black pilose and with a slender, posteriorly-pointed, yellow wedge down the middle narrowly reaching the apex. *Abdomen:* elongate, everywhere black and shining; there is a posterior fascia and medial extension upon the second segment, a medial basal spot on the third segment and the whole of the first segment opaque. The medial vittæ of the second segment from a posterior view is margined with whitish pollen. *Legs:* shining black, the hind femora much thickened in the middle, the anterior fore tibiæ reddish-brown, the hind pair light brownish-red; all of the tarsi are light brown, the hind pair almost orange. Apex of hind tibiæ with a fairly sharp spur. *Wings:* apical half of wings to posterior margin strongly tinged with brown.

Holotype: a female, Summit, Canal Zone, February 24, 1940, A. G. B. Fairchild.

This fly may prove to be the female of *fuliginosus* Hull. However there are a number of dissimilarities as outlined above.

Eristalis thalia n. sp.

Related to *mitis* Curran and *parvulus* Williston. It has no grey spot on the second segment of the abdomen. Thorax brownish-black, black trivittate.

Male. Length 8 mm. *Head:* the eyes are densely long brown pilose, the face front and cheeks are shining black, the sides of the face and front before the antennæ brown. The face below antennæ, and widely on the sides as low as the bottom of the tubercle, is yellowish-white pubescent and long yellowish-white pilose. The pile of the front and vertex is black; of upper occiput mixed black and yellow. Antennæ: first joint brown; others wanting. Eyes not quite touching; they approach one another near the middle of the front. *Thorax:* opaque brownish black, feebly shining along the lateral margins with a narrow, anteriorly attenuated, medial black vittæ evanescent before reaching the scutellum and a similar, slightly wider vittæ on the middle of each half of the mesonotum, obscurely interrupted at the medial end of the suture. The anterior portion of the lateral vittæ is twice as wide as the medial one; the posterior end of this vittæ is pointed. Viewed posteriorly the three vittæ of the mesonotum are separated by two wide yellowish-brown pollinose stripes. Pile of pleuræ and mesonotum, except just behind the suture and upon the posterior half of the post calli where it is black, entirely pale yellow. Scutellum opaque greenish-yellow with the sides, the narrow base and an extremely narrow rim black; its pile is black except upon the extreme rim. Squamæ pale brownish-white with black rim and yellow fringe. *Abdomen:* short, broad, the first segment and upon the second segment a very broad, basally expanded, medial vittæ slightly expanded before the apex and continued at this width over the third segment where it is expanded again apically. Fourth segment wholly black except for its post margin; it has a central, slender, transverse, medially indented, shining black fascia. The black portion only of the third segment has a similar indented shining fascia. Segments two to four have each a wide yellow post margin; the sides of the second and third segment are left broadly light yellow, with in places a brownish tinge. The pile upon the black areas is black and is yellow basally upon the second segment and the corners of the third and fourth. *Legs:* shining black, the bases of the first four tibiæ and the extreme base of hind tibiæ brownish. Hind femora very little thickened, its pile golden except for a few black apical hairs and ventral short and long black bristles on the apical half. The hind tibiæ ends transversely; hind trochanter without special hair. *Wings:* hyaline and bare.

Holotype: a male. Bogota, Department Cundinamarca, altitude 2600 meters (Osorna, collector).

Eristalis antiopa n. sp.

Mesonotal pattern as found in *furcatus* Wiedemann; scutellum slaty black, legs black, abdomen bluish-black.

Female. Length 9.5 mm. *Head:* eyes short, yellowish-brown pilose; the face, cheeks and front are shining bluish-black, the latter yellow just before the antennæ; the sides of the face are broadly silver pubescent and pilose. This pile extends laterally up to the middle of the front. The central frontal pile and occipital pile is widely black throughout. All but the upper part of the front is blackish pollinose, merging laterally into silvery pubescence; the front is bare just above the antennæ and with a narrow, opaque, black vittæ in the middle on the upper part. The antennæ are black, the arista dark brown, bare and white-tipped. *Thorax:* the mesonotum is opaque bluish-black with a median black vittæ proceeding from the base of the scutellum and dividing into two vittæ in the middle of the posterior half of the mesonotum. There are a pair of similar undivided vittæ on either side in the middle running from scutellum to the anterior margin and interrupted at the suture. The posterior section is slightly curved, its lateral sides concave. The mesonotal pile is short and black, the pleural pile white, the scutellum blue-black, faintly shining, its pile chiefly black. The squamæ are white with broad black margin and white fringe. *Abdomen:* black, the second and fourth segment has narrow yellow post margins; the second segment has a basal, posteromedially produced, opaque black fascia which does not reach the sides. It almost touches a rather wide, posterior black fascia which narrowly reaches the posterior corners. The third segment has a similar, narrower, less produced basal fascia and a shorter but equally wide posterior fascia. Fourth segment similar, each fascia still more reduced. Between these black opaque fascia the abdomen is shining metallic greenish-black. *Legs:* shining black, slightly greenish on the hind femora which are considerably thickened in the middle. The extreme base of the tibiæ is dark brown; the first two joints of the middle tarsi are dark brown, the remainder of tarsi black. Hind tibiæ ending transversely; hind trochanters without special hair. *Wings:* hyaline and bare.

Holotype: a female. Villarica, Paraguay (F. Schade); paratypes: two females, same data, one in author's collection.

Eristalis dorothea n. sp.

Related to *scutellaris* Fabricius, this species is characterized by the thick, soft, golden pile of the scutellum and parts of the mesonotum; half of the scutellum yellow; mesonotum with peculiar pattern.

Female. Length 12 mm. *Head:* the eyes are short brown pilose, the face, cheeks and front are black and moderately shining, the sides of the narrow produced face are thickly yellowish pubescent and yellowish pilose. The front is widely shining on the lower half and narrowly yellowish pubescent on the eye margins with an opaque black fascia on the upper half which is a little expanded along the eye margin; viewed obliquely there is a short, linear, yellowish pollinose vittæ on the upper part of the front below the opaque black. There is a rounded protuberance in the middle above the antennæ. Antennæ brown, the third joint blackish, the arista pale brown. *Thorax:* the mesonotum is moderately shining bluish-black with across the middle, just behind and margining the suture, a lateral, evanescent, attenuated, medially club-shaped, opaque black fascia which is medially interrupted. On the anterior half of the mesonotum, anteriorly submarginal, there is a medially interrupted, wide black fascia. Pile of mesonotum yellow on the middle of the anterior half and in front of the suture, and in a narrow band in front of the scutellum in front of and on the post calli; elsewhere the pile is short and black. Pleural pile short and pale. The scutellum is opaque black on the basal half, brownish in the lateral corners, opaque egg-yellow on the remainder; its pile is short, dense and golden with a few longer yellow hairs on disc and rim. *Abdomen:* elongate, slender, apically pointed and shining bluish black; the first segment is opaque black on its posterior and lateral margins and corners. The second segment has a postmarginal fascia, medially indented, laterally attenuated, and a subbasal, medial, rounded, posteriorly acutely filate, opaque black spot. Viewed posteriorly the central portion of this segment is whitish pollinose. The third segment has a similar, slightly wider posterior fascia and no anterior spot. The fourth segment has a post marginal, indented black fascia a little wider sublaterally. Pile of the abdomen very short, chiefly black on the black areas, whitish elsewhere. *Legs:* the femora are brownish-black, the apical half of first four tibiæ diffusely dark brown and growing lighter basally and with pale yellow pile. The hind tibiæ are quite flat, rather arcuate apically and with a very short scoop-like production. Its pile and pubescence is pale. Hind femora greatly thickened in the middle, quite narrow before apex, its pile chiefly brassy; its ventral apical half has many short black spines and some long black bristles. The short black spines reach to the basal third. *Wings:* pale grey, the stigma three times as long as wide, the wing almost wholly villose.

Holotype: a female. Villarica, Paraguay, v (F. Schade).

Microdon barbouri n. sp.

Characterized by the general greenish color, which includes the face, the broad base of the abdomen, and the emarginate scutellum, antennæ black and longer than the face.

Female. Length 11 mm.; antennæ 3 mm. additional. *Head:* almost everywhere brilliant green; golden on either side of the antennæ and eye margins, shining black just before the antennæ with a narrow shallow depression on the lower part of the front, triangular in shape, the apex of the triangles of either side meet just above the shining black area. Pile of face light shining yellow and yellow across the lower part of the front, broadly behind the ocelli and over the whole of the green occiput. There is a band of dense black pile from eye to eye in front of the ocelli and a few black hairs in front of the antennæ. The antennæ are black, the first joint is as long as the last two, the second joint small, the third joint rounded, scarcely flattened with large, elongate subapical pore, its apex bluntly pointed. The arista is brown and thickish except at apex; it is two-thirds as long as the third joint. *Thorax:* mesonotum brilliant, bluish-green, becoming golden in the middle of the anterior half and violaceous just before the scutellum. The pleuræ are green with a golden cast. The scutellum is green with a purplish cast and translucent reddish by a reflected light. The whole pile of the thorax and scutellum is rather thick and moderately long and light golden. Scutellum large, wide and long, emarginate posteriorly; the rounded apical productions are not very far apart; the indentation between is shallow. *Abdomen:* broad, apically pointed, brilliant blue-green; it is golden in the middle of the first segment, still more so along the middle posterior part of the third segment and somewhat golden in the corners of the third segment, where it is continued over on the narrow lateral margins of the fourth segment and again in the anterior corners of the fifth segment. The junction of the gold and blue-green on the sides of the fourth and fifth segments is linearly violet. Pile of abdomen short, appressed, light golden, with on either side a broad, diagonal fascia of black pile on the second to fourth segments. *Legs:* femora golden-green, tibiæ and tarsi light reddish-brown, the tibiæ with faint greenish cast; all of the pile of the legs is thick, long and golden. *Wings:* uniformly tinged with light brown, the apical cross vein bulges outward and is broadly rounded without a spur. The posterior apex of the second posterior cell is similarly rounded.

Holotype: a female. Paranagua, Parana. March 1937. (G. Fairchild collector.) I take pleasure in naming this interesting and beautiful species for Dr. Thomas Barbour, the director of the Museum of Comparative Zoology.

Microdon banksi n. sp.

Because of the shape of the arista this species slightly resembles *pachystylum* Will., but it is quite different in coloration and venation and other details.

Female. Length excluding antennæ 6.5 mm.; antennæ about 2 mm.; wing 5 mm. *Head:* eyes very widely separated, the upper occiput extremely thickened but with rounded posterior margin, the vertex shining brownish-black; the pile just in front of the ocelli, just behind it and again just in front of the antennæ black, elsewhere the pile of the head is wholly shining pale brassy. Along the upper occiput near the eyes the pile appears to be directed towards the eye margins; upon the inner upper eye margins it is directed towards the ocelli; from a point in the middle of the very broad front it appears to be directed in all directions, and opposite this mid-point it is upon the eye margins directed first towards the antennæ and then down ventrally towards the face. About the antennæ the pile is slightly more reddish and upon the face more whitish. Face short, not in the least produced, quite convex, most so upon the lower half, the pile thick, abundant, shining and directed downward but not flattened. Viewed from in front the sides of the face are more equally wide, perhaps barely wider below than across the antennæ. The ground color of the face in front is shining brownish-black. Antennæ elongate, the first joint but little over one-half as long as the third and together with the second and the extreme base of the third reddish-brown. The third joint is black, slightly narrower in the middle, upon its outer surface slightly curved, about twice as thick as the also outwardly curved first joint; arista basally produced from the outer side, very short, and thickened into a basally blunt spear-shaped structure, the tip needle-shaped, the whole arista light reddish. *Thorax:* almost as wide as the head, moderately shining brownish-black with more or less erect black pile except as follows: some pale brassy pile bordering a lunate, shallow depression on each half of the anterior part of the thorax, again narrowly across the mesonotal transverse suture, upon a sublateral stripe along the posterior half of the thorax and again in acute short triangles, one on each side, reaching forward from the posterior margin of the mesonotum. Pile of scutellum wholly erect and pale; its ground color dark blackish-brown, the surface sharply flattened and roughened; without spines or emarginations. *Abdomen:* relatively short, compact, wholly dark blackish-brown, a little lighter upon the first segment; its pile thick, sharp and setaceous, chiefly black and only suberect. Along the posterior margins of the third, fourth and fifth segments there is appressed, golden, quite sparse and scattered pile that is unusually long, it encroaches extensively upon the middle of the fifth segment but is scarcely present in the midline of the third segment. There is a similar patch broadly and outwardly along the posterior margin of the second segment. *Legs:* the femora, except the narrow apices, very shining dark chestnut-brown, the pile over this area black. Apices of all of the femora, whole of tibiæ and tarsi light yellowish-brown, also quite shining; tibial pile chiefly pale on the basal half, but reddish-brown apically. Hind femora very little thickened. *Wings:* broad, and deep, strongly tinged with brown, a heavy stigmal cross vein present; the subapical cross vein on its basal half is rounded outwardly; it joins the third longitudinal vein at right angles, there is a well developed spur from the posterior corners of both the first and second posterior cell.

Holotype: one female. Coast below Pico Turquino, June 20–30, 1936, Cuba 1936, Darlington collector. One paratype female, same data, in author's collection.

I take pleasure in naming this interesting species for Professor Nathan Banks.

In the second female the lunate depressions of the thorax seem to be absent, the pile of the anterior half, at least on the sides, is almost wholly golden, there is a narrow median vittæ of golden pile with a broad heavy stripe of black pile on either side of it interrupted at the suture and the lateral margins on the posterior half seem to be wholly golden pilose, the lateral margins of the anterior half of the mesonotum however are black pilose. The third antennal joint is almost wholly light brownish-red, only the apical third being infuscated.

Volucella osburni n. sp.

Related to *sexpunctata* Loew. There are only twelve bristles on the arista; the profile of the face is different.

Male. Length 8 mm. *Head:* eyes densely brown pilose, the face cheeks and front light translucent yellowish-brown, a little more reddish on the lower part of the face and cheeks; the latter is separated by a narrow black line. The pile of the face is yellow, of the front dense, long and black. In profile the tubercle is low and long. Antennæ orange, the third apex of the joint considerably more narrow than the base. The dorsal rays of the arista are about twelve and blackish; the arista pale yellow. The vertical pile is yellow. *Thorax:* mesonotum and pleuræ shining black, the wide lateral margins of the former including the humeri, the whole of scutellum and a spot in front of the scutellum light, subtranslucent brownish-yellow. All thoracic and scutellar pile is golden. Scutellar margin with three pairs of stiff yellow bristles and none in front of the scutellum. Marginal mesonotal bristles golden. Squamæ and fringe yellow. *Abdomen:* light translucent brownish-yellow, the middle and the posterior border of the first segment, a median vittæ and a lateral, elongate postmarginal fascia on the second segment shining black. Third segment with a similar but much narrower, medial, anteriorly attenuated, vittæ and similar short fascia in the posterior corners. The fourth segment has a still narrower, median vittæ attenuated at both ends and in each posterior corner an elongate vittate spot twice as long as wide. Pile of abdomen everywhere short, thick, erect and golden except on the black areas of the second segment where it is black. There are a few black hairs along the lateral portion of the post margin of the third segment. The whole pile of the fourth segment is long, erect and golden. *Legs:* brownish-yellow, the anterior side of hind femora with an elongate, blackish-brown streak fading on the outer third. The narrow bases of the other femora are slightly blackish; the anterior and hind tibiæ are narrowly blackish at apex; the last two tarsal joints blackish. Pile of legs golden except apically along the tibiæ. *Wings:* hyaline with pale yellow veins and basal half of stigmal cell pale yellow. Stigma brown, twice as long as wide, costal setæ black.

Female. Similar to the male, the black cheek lines are faint or confined to a tiny spot on the eyes. Front pale yellow, the crescentic area along the eyes punctate, the area between the red ocelli blackish, its pile yellow. Mesonotum similar, the wide median black area replaced by light brown. The yellow prescutellar spot may be quite large. Pattern of abdomen similar. The median vittæ upon the second segment is reduced to a slender brownish streak; the first segment may be wholly yellow; the vittæ upon the third and fourth segment are reduced.

Holotype: a male, Villarica, Paraguay, X (F. Schade). Allotype, a female and eight paratypes, all with the same data. I take pleasure in naming this species for Dr. R. C. Osburn.

Baccha nectarina n. sp.

Related to *phæoptera* Schiner; the wings are wholly dark brown, the pattern of the abdomen is different.

Male. Length 17 mm. Wings 13 mm. (longer than the abdomen). *Head:* cheeks and face yellow, the former brownish in front, the latter brownish on either side of the yellow-brown tubercle, and forming apparently two diffuse vittæ. The front is brownish-yellow and brown semicircularly in front of the antennæ which leaves, in front of the semi-circle a light brown spot in the center of which is a large, shining black, rounded callus. The upper part of the front has a subopaque, blackish triangle, almost equilateral, its apex touching the convergence of the eyes. The upper eye margin of the front is linearly blackish. The pile of the face, front and vertex is black, and golden on the whole of the occiput. The antennæ are orange and black pilose; dorsal margin of the third joint brownish-black; the third joint in its longest lateral length about one and one half times as long as deep; arista light brown. *Thorax:* brownish-black with three slender brownish-yellow pollinose vittæ; the outer pair becomes quite slender on the posterior half and expanded on the anterior margin. The lateral margins of the mesonotum including the whole notopleuræ are widely brownish-yellow and are medially margined with brassy-black. The whole of the mesopleuræ except the anterior margin, upper part of sternopleuræ, whole of pteropleuræ, upper parts of meta and hypopleuræ are yellowish-brown. The scutellum is dark brown, the narrow base and rim yellowish; the pile sparse, exceedingly short and black. *Abdomen:* quite elongate and spatulate, increasing gradually to the end of the fourth segment; it is chiefly black and shining, becoming sepia brown over most of the long second segment and the lateral margins and corners of third and fourth segments and upon the middle and posterior margin of first segment except its sides and corners. The ventral, lateral corners of second segment are yellowish. Just before the apex on either side of the second segment there is an obscure, elongate, yellowish-spot and there is a similar, submarginal, basal, posteriorly-pointed spot on the third segment. On the fourth segment there is a similar, submarginal, larger basal spot, each posterior corner of which is produced posteriorly; the lateral corner ends bluntly, the medial corner is carried back and there is a long, slender, curved yellowish-brown line, its outer margin concave. On the fifth segment there are traces of four slender, basally expanded yellowish-brown linear vittæ. The pile of the abdomen is extremely short and sparse and bristly; on the sides of the first segment it is sparse, quite long and fine. *Legs:* chiefly yellow, the middle femora light brown, the hind femora darker brown, its apex narrowly yellow, its pile black. Hind tibiæ black over most of its length; its base and apex are pale, its pile, except on the ventral apex black. The hind tarsi are whitish-yellow with similar pile. *Wings:* deeply tinged with brown throughout, the anal crease is long but quite obsolescent. The apex of the subapical cross vein is recurrent.

Holotype: a male. Villarica, Paraguay, III (F. Schade collector).

Baccha olga n. sp.

Characterized by the sepia-brown stigmal cell, apical spot and small central spot of the wing, the black face and spatulate abdomen. Related to *lanei* Curran and *bigoti* Austen.

Female. Length 10 mm. *Head:* the face, front and cheeks are shining black with a slight bluish tinge; the sides of the front are narrowly covered with pale grey pubescence to above the middle where it extends transversely across in an interrupted band. It is also continued down the eye margins where it spreads out on either side of the face on the lower half, leaving a narrow middle lower stripe bare. Profile of face straight and retreating, its pile and the very few hairs of the front white. Antennæ brown, the third joint blackish-brown, its base and ventral margin narrowly pale yellow. Arista light brown. *Thorax:* mesonotum and scutellum black with a metallic brownish or golden caste, its pile white, and appressed except on the anterior border and except for a few erect hairs in front of the scutellum. Scutellar pile wholly erect; pleuræ white pilose and pubescent over the mesopleuræ, sterno and notopleuræ, the pile of the latter spreading over the anterior edge of the notopleuræ. *Abdomen:* quite spatulate, the second segment very narrow basally, its subbasal width is scarcely more than a third its apical width; the third segment forms almost an equilateral triangle, basally truncate; the third segment is not quite as long as the second, nor the second quite as long as the fourth. The fourth segment is very little narrowed apically. The abdomen is shining black, the anterior corners of the third segment show a trace of reddish-black. Pile of the abdomen appressed and black in the center of the third and fourth segments and extensively white along the sides and base and everywhere white upon the fifth segment except for the posterior middle. *Legs:* black, the anterior femora are dark brown basally, growing paler towards the apex; the apex of the middle femora is light brown, the basal half of the first and second tibiæ and their apices and the narrow base of the hind tibiæ whitish-yellow. The central portions of the first four tibiæ are brown; remainder of hind tibiæ black and black pilose. Front tarsi, first two joints of middle tarsi, apical half of hind basi tarsi and its next two joints whitish-yellow. Remaining tarsi brown. *Wings:* hyaline, the stigmal cell and an elongate marginal spot on the apex of the wing covering the end of the marginal cell, and the end of the submarginal cell as far as the third longitudinal vein, dark brown. There is a dark brown spot, rather narrow covering the furcation of the second and third veins and extending back to cover the closure of the second basal cell. The costal and base of subcostal cells are also brown.

Holotype: a female, Chilibre, Republic of Panama, 1940 (A. G. B. Fairchild collector).

Baccha oriel n. sp.

Characterized by the slender abdomen and pale wings and the proportionate shape of the segments. Fourth segment less than twice as wide as the second. Related to *lepida* Macquart.

Male. Length 9 mm. *Head:* the face, and front except for a crescentic brown spot enclosing a black dot before the antennæ, and cheeks orange yellow. Pile of front thick, long and black, sparse upon the upper part of the face. The antennæ are orange, its pile and arista black, its length short. *Thorax:* light yellow upon all of the pleuræ except for a wide, continuous, oblique, posterior band, light yellow upon the humeri, the broad sides of the mesonotum and the post calli. The disc of the mesonotum is brassy brown with a pair of prominent, yellowish pollinose vittæ that slightly diverge and become evanescent before they reach the scutellum. Between them there is a faint linear pollinose vittæ. Scutellum pale yellow, the disc brownish-yellow, and sub translucent viewed from above, but brown when viewed obliquely. On the disc are eleven long black erect hairs and five upon the margin. I can only see a single central pair of elongate hairs constituting the ventral fringe. *Abdomen:* elongate and slender, brown to brownish-black apically, the sides of the first segment and its narrow base and the narrow basal corners of the second segment light yellow. Just before the apex of the second segment is an orange-brown, transverse fascia medially produced in front and narrowly margined with opaque brown. Third segment with an elongate, obscure, central yellow-brown triangle on either side, its apex bifid and the two triangles apparently contiguous on most of their medial length. Fourth segment similar, the subcoalescent triangle a little more distinct, the medial posterior indentation deeper leaving the figure somewhat V-shaped on each side (inverted) and its lateral arm shorter. Fifth segment with prominent, narrowly divided submedial vittæ that do not quite reach the apex but expand along the base of the margin to the corners and sublaterally emit a narrower stripe which is not quite as long as the submedial ones. *Legs:* wholly light brownish-yellow; there is a faint, preapical brown band on the hind femora. Pile of hind femora short, appressed and quite sparse. *Wings:* uniformly pale brown, the stigmal cell darker.

Holotype: a male. Loma Rucilla and Mts. N., Dominican Republic, June 1938, 5–8,000 feet altitude (P. J. Darlington collector). One paratype, same data.

Baccha cryptica n. sp.

Second abdominal segment longer than third, six or more times as long as its subbasal width. Black flies, the wings smoky-brown almost to apex. Sides of the face broadly yellow. Related to *ida* Curran and *clarapex* Wiedemann.

Male. Length 12 mm. *Head:* the face widely light yellow upon the sides, the cheeks blackish, the middle of face on the tubercle and above widely blue-black, narrow so below the tubercle but above extending on either side of the antennæ to the blue black front. Sides of the front linearly yellowish and with a narrow eye-marginal stripe on the upper part of the front which is silver pubescent. The upper third of the triangle of the front is opaque black and long, erect black pilose, the pile largely confined to areas along the eye margin and extending down to the upper part of the face, lower facial pile white. Antennæ black, the third joint reddish below. Arista blackish except at base. Occipital pile black above, black in the middle excavation and composed of practically a single row of sparse yellow hairs. *Thorax:* dark sepia-brown, moderately shining with a slight violaceous narrow vittæ sublaterally on either side of the mesonotum. Pile short, erect, black and quite sparse. Pleuræ with a yellowish-white pilose and pubescent vertical stripe. Scutellum dark brassy-brown, its pile short, erect and very sparse, its ventral fringe of ten or twelve hairs pale. *Abdomen:* elongate and spatulate and almost wholly brownish-black, the second segment very little narrower than its apex and a little over six times as long as its subbasal width. The apex of the third segment is two and a half times or more wider than its base. Fourth segment almost quadrilateral and barely wider apically. Second segment with a wide, medial, subbasal opaque black vittæ which apically expands to form a subapical fascia some distance from the apex. It is posteriorly indented. All of the third segment black except for prolonged basal and lateral triangles and for an apical margin laterally attenuated. Middle of the opaque black with a pair of small, slender, yellowish vittate spots. Fourth segment opaque black except for narrow basal triangles and a narrow posterior margin widest in the middle. There are similar spots centrally on the fourth segment. There are three, oval, elongate, basal opaque black spots on the fifth segment. The pile of the abdomen is appressed and black but whitish and long on the sides of the first segment, shorter and white on the sides of the second. *Legs:* dark brown, the base of the first four tibiæ diffusely and obscurely paler; the medial surface of the anterior femora is yellowish-brown, the hind tibiæ and basal two-thirds of the hind basi tarsi black and black pilose, their remaining tarsi yellowish-white, the other tarsi dark brown. Pile of hind femora black and short. *Wings:* large, barely longer than abdomen, deep smoky-brown, growing a little lighter narrowly over the posterior margin and apex. The anal crease is long, blackish, well formed and reaching the apex.

Holotype: a male. Villarica, Paraguay, March (F. Schade collector).

Baccha bipunctipennis n. sp.

Second abdominal segment eight to ten times as long as its middle width. The apical and central wing spots are less extensive than in *lanei* Curran. Head femora and tibiæ largely black, black pilose.

Female. Length 10 mm. *Head:* the face, front and cheeks are shining blue-black, the sides of the front narrowly white pubescent, the pile on the sides long and white, black in front of the antennæ and black and white above and confined to a narrow, medial row behind the ocelli. The occipital collar in the middle consists of a single row of pale yellow hairs but with shorter hairs outside, the upper hairs black. Face nearly straight in profile but retreating, white pilose and pubescent on the sides and lower middle. The antennæ are short and dark brown, the third joint about as long as wide and more reddish. *Thorax:* shining black with sparse white pubescence, vertically over the middle of the pleuræ and notopleuræ; pile of mesonotum and whole of scutellum erect and white, suberect anteriorly on the mesonotum and with a band of black pile across the middle; the long marginal hairs of the scutellum and about twenty long ventral fringe hairs are white. *Abdomen:* very slender upon the quite elongate second segment which must be eight or ten times as long as its narrowest width. Third segment a little over four times as wide apically as basally. Fourth segment almost quadrilateral and barely narrowed apically. The remainder of the abdomen is drawn out into a long, flattened, very thin extension which may or may not be natural. The fifth segment is not quite twice as wide as long and scarcely narrowed; the sixth segment is of the same proportion and shape and only a little smaller. Following this is an additional flat extension two and a half times as long as wide and very little narrowed; the abdomen terminates beyond this in an acute, triangular, pointed, flattened, apically reddish ovipositor. Color of abdomen shining black, brownish-black upon the second segment and vaguely upon the corners of the fourth segment. The base of the third segment is somewhat lighter brown. Entire abdomen shining, its pile broadly and triangularly erect and white in the basal corners of the third and fourth segments and over all but the apex of the fifth segment. The entire lateral margins of the second segment white pilose, medial pile black. Pile of first segment long and white and abundant, its apex and middle bare. *Legs:* the front and middle femora are reddish brown, the hind pair dark brown, its apex narrowly lighter, its pile almost wholly black. Front and middle tibiæ and tarsi and all the hind tarsi except the basal three-fifths of its basi tarsi light reddish-yellow. Base of hind basitarsi, which is considerably thickened, black and black pilose. Hind tibiæ blackish-brown except narrowly at the base and with rather long, thick blackish pile. *Wings:* quite hyaline with the costal, subcostal and stigmal cell and an elongate apical, marginal spot occupying the ends of the marginal and end of the submarginal to barely beyond the third longitudinal vein and also a central, somewhat triangular spot, from a short distance before the furcation of second and third vein, to just beyond the small cross vein, and extended posteriorly to fill out the basal part of the third posterior cell and to extend down to the middle of the posterior section of the fifth longitudinal vein.

Holotype: a female. Bella Vista, Paraguay, February (Alto Parana) F. Schade collector.

Baccha potentilla n. sp.

Characterized by the shining black abdomen, widely smoky wings and the shape of the abdominal segment. Second abdominal segment about two and a half times as long as wide. Related to *clarapex* Wiedemann.

Male. Length 10 mm. *Head:* the cheeks, middle of face and front shining steel-blue, the central portion of the front more blackish, the upper middle front opaque with on either side a pair of semicircular, silver pollinose, eye-marginal spots. Pile of front and upper part of face long and black. The frontal pile is largely confined to the eye margins. The lateral silver pubescence of the face continues in moderate width up the sides of the face to a little above the antennæ. The post ocelli pile is black, confined to a single row of hairs. Occipital pile composed of one long posterior row and one shorter lateral row; its upper pile is yellow. The antennæ are somewhat elongate, dark brown, the third joint below and base of arista reddish. Sides of face narrowly yellowish. *Thorax:* mesonotum shining brownish-black with, viewed posteriorly, a pair of broad, submedial, brown pollinose vittæ evanescent in the middle of the mesonotum but expanded anteriorly to form large triangles. Viewed anteriorly or laterally there are, between these vittæ quite slender and almost touching, a pair of brown vittæ. The pile of the mesonotum and scutellum and its ventral fringe black. Pleuræ steel-bluish with a trace of white pubescence in the middle and with white pile. Squamæ light brown with fringe brown. *Abdomen:* spatulate, the second segment about two and a half times as long as wide and subcylindrical. Third segment not quite twice as wide apically as basally. Fourth segment almost quadrilateral, barely wider apically. Abdomen shining black, bluish upon the first segment with a medial, opaque black vittæ upon the second segment expanded some distance from the apex to form an oblique fascia reaching the curved-under lateral margin. Third segment with a pair of practically fused, slender, medial vittæ proceeding from the base to within a short distance from the apex and narrowly separated from large, submedial triangles beginning near the base, ending where the medial vittæ end and extending laterally out to the margin and almost to the apex. Fourth segment with a similar pattern, the submedial vittæ separated, the lateral triangles smaller. Fifth segment with four slender vittate spots on the basal part of the segment. Lateral basal margin of second segment steel-blue. Pile of abdomen appressed and black, white ventrally on the sides of the first segment with long black pile above. *Legs:* first four femora dark brown, lighter at apex, their tibiæ dark brown but pale narrowly at the base and at the extreme apex, their pile almost wholly blackish. The hind femora and tibiæ, and all but the narrow apex of the hind basi tarsi, black and black pilose. Last hind tarsal joint brown; other three joints yellowish-white and white pilose. First four tarsi brown. *Wings:* deep brown except upon the apical fourth which is pale greyish hyaline. Anal crease well formed and brown.

Holotype: a male. Villarica, Paraguay, March, F. Schade collector.

Baccha pandora n. sp.

Characterized by the prominent yellow vittæ of the thorax and the pattern of the abdominal spots. Submedial vittæ of the fourth segment quite large, broadly connected to the anterior triangle. Related to *livida* Schiner.

Male. Length 12 mm. *Head:* the cheeks and face and front are pale yellow; just before the antennæ there is a sharp black oval spot and above this a reddish-brown spot. The rather elongate antennæ are orange, narrowly brownish above on the third joint, the pile black, the arista brown. The pile of the front and upper part of face is black, the former largely confined to the sides of the front. There is a band of white pubescence along the sides of the face extending narrowly on the lower part of the front. There are some white hairs below. *Thorax:* the whole of the pleuræ except the extreme ventral portion above middle and hind coxæ light yellow with a few yellow hairs and some yellowish pubescence. The wide margins of the mesonotum and the whole of the scutellum, except a central transverse brown band over most of its disc, yellow. The mesonotum is broadly golden-brownish centrally with three stripes of brown and two of yellow pollen, all of about equal width. The medial brown stripe is narrowly divided by a linear, yellow pollinose vittæ which expands posteriorly until just before the apex it is as wide as the pointed apical part of the two outer vittæ. The medial vittæ touches the scutellum, the others do not. Mesonotal pile sparse, erect and black, a few pale hairs before the scutellum and upon the lateral margin. Scutellar pile short, erect, quite sparse, appressed laterally, the ventral fringe yellow. *Abdomen:* quite elongate, almost as long as the wings and somewhat spatulate, the second segment four to five times as long as its central width; it is a little wider at base, but the remainder has almost parallel sides. Third segment barely over twice as wide apically as basally; the fourth segment is not quite as long as wide and a little wider apically than basally. The abdomen is dark brown with yellow markings. The whole of the first segment is yellow except at posterior margin, the posterior corners also yellow. The second segment has an hour-glass shaped brown spot beginning a short distance away from the base, almost reaching the posterior margin and actually reaching this margin laterally. The lateral ends of the brown spot turn up and down along the margin to enclose the intervening yellow which is almost isolated into elongate, oval, lateral spots. Third segment brown except for large basal triangles, narrowly extended two-thirds of the lateral length. In the brown there is a pair of central, large, elongate, posteriorly rounded, anteriorly attenuated, vittate yellow spots; these spots are at least twice as wide posteriorly and separated below their middle by a third of their width. Fourth segment with a pair of somewhat similar, longer, medio-posteriorly truncate, vittate spots that are widely confluent with a larger basal triangle. The basal triangles almost meet in the midline. Fifth segment similar, the central spots meet and fuse at the posterior margin, the smaller basal triangles are separated from the lateral margin and are laterally continued as a vittæ to the posterior margin. Pile appressed sparse, bristly and blackish; there are a few bristly hairs on the anterior margin of the brown of the first segment and quite long, sparse, yellow pile upon the sides and corners of this segment. *Legs:* everywhere light yellow and yellow pilose except over the middle third of the hind tibiæ which is black and blackish pilose. Hind femora reddish-brown on the basal half, darker beyond but yellowish at apex, its pile is chiefly black. There are a few black hairs posteriorly on the middle femora. *Wings:* light brown throughout, the apical portion above the third longitudinal vein and the whole of the stigmal cell darker brown. Anal crease long, well formed and brown.

Holotype: a male. El Valle, Cocle Province, Republic of Panama, July 2nd, A. G. B. Fairchild collector.

Mesogramma tubularia n. sp.

Characterized by the elongate, parallel sided abdomen with double fascia and median vitta; related to *flava* Hull.

Male: Length 8 mm. *Head:* face pale yellow, short, white pilose, barely tuberculate; front yellow, black pilose, with an elongate brownish spot in the middle. Eyes touching for a quite short distance. Antennæ, and arista except its reddish base, dark brown. *Thorax:* mesonotum dark bluish-black, brown pollinose, with a prominent, continuous, medial blue grey vittæ, and a narrow, sublateral, yellowish-brown stripe which ends before reaching the pale yellow humeri. Scutellum brownish-black, the edges narrowly diffusely yellowish-brown.

Abdomen: quite elongate and flattened, the sides parallel. The abdomen is black marked with yellow as follows: the extreme anterior margin of the first segment on either side, a narrow medially interrupted, laterally evanescent central fascia on the second segment, a basal, laterally narrow, submedially much expanded fascia upon the third segment, which is medially connected with a long linear vitta, a pair of horn-shaped spots centrally, separated from the medial vittæ, their medial and truncate, their pointed lateral end curved forward a little and not reaching the margins. Fourth segment with a pattern similar in size and shape, its medial vittæ a little expanded at apex; fifth segment with a pair of sublaterally black spots, a pair of lateral, marginal, elongate spots posteriorly, and a long vittate and medial basal spot, all black upon an orange-brown background. The central yellow pattern of the second and fourth segments is outlined in opaque black; elsewhere the black is shining. *Legs:* chiefly black pilose and yellow brown, the hind femora barely darker, the hind tibiæ medially brown centrally but more yellowish at base and apex. *Wings:* pale grey; alula post margin nearly linear.

Holotype: a male. Banos, Ecuador, 2000 M. VII–14–1939. Type in the collection of Dr. C. L. Fluke.

Mesogramma triangulata n. sp.

Characterized by the pairs of yellowish brown triangular spots upon the third and fourth segments. Related to *guttifera* Hull.

Female. Length 6 mm. *Head:* the sides of the face are yellow, the cheeks and middle brownish black, the front flat, shining brownish-black, the sides narrowly sharply yellow to near the ocelli. Vertex convex, violaceous behind and black pilose. Face pile white with antennæ dark brown. *Thorax:* mesonotum greyish or bluish black, grey pollinose. Viewed laterally with a pair of very broad opaque brown vittæ reaching the scutellum. Lateral margins concolorous. The humeri, a somewhat obscure pleural spot and vertical stripe on pleuræ yellow. *Abdomen:* oval, shining brown, the corners of the first segment, its extreme anterior margin the narrow margin of the second segment almost to the apex but not expanded apically yellow. There is a pair of tiny, transverse yellow spots in the middle of second segment. On the third segment there is a pair of subbasal, widely separated, rather large, posteriorlaterally convex, yellowish-brown triangles. They are separated from the narrow, yellow lateral margin of the anterior half of the segment, but are slightly produced in the direction of the margin. Fourth segment with similar pattern. Fifth segment with a pair of subbasal, transverse spots narrowly connected across the middle posteriorly. *Legs:* yellow, the tarsi light brown, the hind tarsi darker basally and apically, the hind femora with a dark brown subapical annulus, their tibiæ with a subbasal annulus. *Wings:* hyaline, the alulæ large.

Holotype: a female. Villarica, Paraguay, March 4, 1938, F. Schade. (In the collection of C. L. Fluke.)

Mesogramma alphabetica n. sp.

Characterized by the pair of large, yellow, crescentic spots on the base of the third and fourth segments which are narrowly fused with the lateral triangles. Related to *confusa* Schiner.

Female. Length 4 mm. *Head:* face, the narrow sides of front and all of the antennæ except the blackish dorsal half and apex of third antennal joint, pale yellow. The cheeks and the middle of the front are shining black, the latter bluish margined; vertex golden. *Thorax:* mesonotum shining blackish with steel-blue median vittæ, the wide lateral margin of the humeri and margin of scutellum yellow, the mesonotum yellow, narrowly black marginate, followed by an obscurely bluish stripe. Disc of scutellum black, all its pile long and black. *Abdomen:* oval, rather broad; first segment black with yellow corners and margins; second segment with narrow, central, laterally arcuate, linearly divided yellow fascia. Third segment with two large, thick, deeply crescentic, basal yellow spots facing one another and narrowly connected basally with the large, yellow, equilateral triangles. Fourth segment with similar pattern, not connected basally. Fifth segment with similar pattern, the more elongate triangles widely separated. *Legs:* yellow, first four femora with blackish dorsal subapical spots. Hind pair black on apical half except its apex, their tarsi and tibiæ except extreme base blackish; other tarsi light brown; last front tarsus yellow.

Holotype: a female. Jalapa, Vera Cruz, Mexico, July 8, 1935, A. E. Pritchard. (Collection of C. L. Fluke.)

Mesogramma nymphalia n. sp.

Related to *rhombicum* Giglio Tos. The second segment is almost wholly yellow, the abdomen is wider.

Male. Length 5 mm. *Head:* cheeks black, the yellowish-red face short. Antennæ reddish. Vertex bright greenish-blue. Mesonotum black with obscure greyish median vittæ, the pleuræ black with yellow vertical stripe; humeri, lateral margins and margin of scutellum bright yellow. *Abdomen:* elongate with nearly parallel sides; vitreous, dark brown to black with pattern as follows: posterior margin of first segment black, base of second segment with a laterally attenuated brown fascia, the corners yellow and the apex with a shining purplish-black fascia narrowly separated by reddish in the middle. The fascia is a little over a third of the segments length. Third segment with medial reddish-brown vittæ and facing it on either side a basal, crescentic, reddish spot widely connected to the large basal lateral reddish triangle. Fourth segment with similar pattern, the crescentic spot more slender and disconnected. Fifth segment with the lateral margins and widely separated submedial vittæ, the latter slightly curved, reddish. *Legs:* yellow, the hind femora with wide black apical annulus, its pile black, the ventral pile long, their tibiæ dark brown except at base and apex, their tarsi brownish. *Wings:* pale brownish hyaline, the alulæ narrow.

Female. Abdomen spatulate, the pattern similar, the crescentic spots of third segment deeper, the medial vittæ connected to a submarginal posterior fascia.

Holotype: a male. Rio Margajitas, Equador, 1250 meters, March 1939 (F. M. and H. Brown). Allotype: female. Sucua, Equador, 950 meters, Rio Bland, 1939. Paratypes: male, Rio Margajitas; male Puyo, Oriente, Equador; female, Rio Mapeto; two females Puyo, Oriente, Equador. (In collection of C. L. Fluke.)

Mesogramma claracunea n. sp.

Characterized by the opposed yellow crescents, median vittæ and yellow corner triangles of the third and fourth segments; related to *confusa* Schiner.

Female. Length 6 mm. *Head:* front black, narrowly yellow along the sides, the face yellow and short. *Thorax:* blackish, the humeri and the lateral margins yellow, the scutellum black with light brown margin. *Abdomen:* flattened and rather broad, the first segment black except upon the anterior lateral corners. Second segment black with yellow pattern as follows: a pair of submedial spots rounded posteriorly, concave medially, angulate anteriorly and diagonally attenuated as they extend towards the lateral margin and somewhat in the direction of the anterior corners. They are narrowly separated from a lateral, obtuse triangle of yellow whose long face lies upon the lateral margin and which is continuous with the yellow of the anterior corners. Third segment with the anterior half of the lateral margin occupied by an acute triangle which is narrowly separated from a pair of crescentic yellow spots on either side of the segment. These crescentic spots lie close to but not touching a narrow, medial, linear, yellow stripe which is evanescent both anteriorly and posteriorly. Fourth segment similar, the lateral basal yellow triangle a little more distant from the crescent. This segment has basal corner triangle and small yellow crescents but no medial vittæ. *Legs:* brownish-yellow, the hind femora and tibiæ with wide subapical and subbasal smoky bands. *Wings:* pale brown hyaline; alulæ narrow and strap-shaped.

Holotype: a female, Rio Margajitas, Rio Pastaza, Equador, 1250 meters, 20–III–29, F. M. and H. Brown collectors. (In collection of C. L. Fluke.)

NOTES ON HIPPOBOSCIDAE. 18. THE GENUS *BRACHYPTEROMYIA* WILLISTON; WITH THE DESCRIPTION OF A NEW SPECIES (DIPTERA)

By J. Bequaert [1]

Brachypteromyia Williston

Brachypteromyia Williston, 1896, Ent. News, VII, p. 184. Monotypic for *Brachypteromyia femorata* Williston, 1896 = *Anapera fimbriata* Waterhouse, 1887.

Brachyptomyia Speiser, 1907, Ent. News, XVIII, p. 104. Misspelling of *Brachypteromyia*.

Brachypteromia Aldrich, 1907, Jl. New York Ent. Soc., XV, p. 6. Misspelling of *Brachypteromyia*.

Head horizontal, oval, as long as or longer than wide, deeply inserted in the very concave humeral margin of the thorax. Dorsal appendage of second antennal segment long, flattened, rounded off at apex. Eyes small, of many small facets, elliptical, placed dorso-laterally and far from fronto-clypeus and postvertex. Fronto-clypeus occupying nearly half the length of the head, separated by a long mediovertex from the large postvertex. Palpi well developed. Ocelli absent. Thorax with large, lobate humeral callosities and prominent preälar angles; dorsal sutures either vestigial, incomplete or absent. Scutellum transverse, short, distinctly divided from the mesoscutum. Mesothoracic spiracle dorsal; metathoracic spiracle between the more or less developed metapleural ("pleurotergal") protuberance and the base of the hind coxa. Legs very long and thick; tarsal claw three-toothed, the basal "heel" being unusually long and slender; two pad-like pulvilli and one slender, feathered empodium. Wing functionless, reduced to a very short pad, about as wide as long, with a few thick rudimentary veins in the anterior half. Halteres well developed. Abdomen with only the basal and sometimes a pair of preäpical dorsal sclerites differentiated; otherwise membranous and uniformly hairy above and below; no median striated area dorsally. Pilosity of body and legs very long and dense, the whole insect hirsute.

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[1] From the Department of Comparative Pathology and Tropical Medicine, Harvard Medical School, Boston, Mass.

Brachypteromyia is closely related to *Myophthiria* Rondani, with which genus Ferris (1928, Pan-Pacific Entom., IV, p. 140) proposes to unite it. No serious objection to such a course can be offered. The discovery of a second species, much more like *B. fimbriata* than like the two or three known species of *Myophthiria*, suggests, however, that *Brachypteromyia* might be retained at least with subgeneric rank. Three main differences can be pointed out between the two groups. In *Myophthiria* the thorax is slightly less evolved, with the dorsal sutures more distinct, the scutellum longer and narrower, and the chaetotaxy sparser and more in accordance with the primitive arrangement. The wing is longer and narrower, with the venation more distinct and somewhat less reduced. The abdomen is much less hirsute; in the female it bears dorsally a pair of transverse preäpical sclerotized plates, preceded by one or two small median sclerites; while in the male there are, in addition to the preäpical pair, three transverse median tergal plates, the hindmost of which is very large.

The three females of *B. fimbriata* examined show dorsally no traces of median sclerites nor of sclerotized preäpical plates. In two males of that species there appear to be two minute preäpical sclerites, placed far apart; but I can find no trace of them in the male holotype of *B. neotropica*. More material will have to be studied before a final conclusion can be reached. If, however, the difference in the structure of the abdomen proves reliable, there might be some justification for retaining *Brachypteromyia* as generically distinct from *Myophthiria*.

It should also be noted that *Brachypteromyia* is the most specialized type of the subfamily Ornithomyinæ. It is the final step in a series of changes leading from the fully winged to the subapterous condition. This series, one of the most instructive evolutionary sequences I am acquainted with, is perhaps best understood by following first the gradual reduction of the wings. The more common species of *Ornithomyia*, such as the Palearctic *O. avicularia* (Linné) and the Holarctic *O. fringillina* Curtis (= *O. anchineuria* Speiser), have fully developed wings, with a complete venation, and are as good fliers as any of the Hippoboscidæ. Some species, however, such as the Indian *O. comosa* Austen, show a decided shortening of the wing, though the venation remains normal. The further reduction of the wing to a functionless condition apparently proceeded along two different lines. In one, leading to *Stenepteryx*, the wing retained its length, but reduced its area by losing most of the membrane, while some of the veins disappeared and the remainder were crowded near the costa. In the other, leading through *Crataerina* and *Myophthiria* to *Brachypteromyia*, the whole wing was shortened, with concomitant loss of most of the venation. All known species of these four subapterous genera appear to be incapable of flight. Moreover, the reduction of the wings was accompanied by other changes which affected nearly all parts of the body. The most striking of these are the lengthening of the head, the reduction of the eyes, the loss of the ocelli, the obsolescence of the dorsal thoracic sutures, the gradual disappearance of most of the tergal plates of the abdomen, and the unusual development of the legs and particularly of the claws.

The restricted choice of a host and even more so the type of host selected were no doubt the main factors which determined this orthogenetic evolution. Most species of *Ornithomyia* show very little host specificity, being found mainly on a variety of passerine and some game birds. Some species, however, are restricted to swallows and martins (Hirundinidæ) and *O. comosa* is one of these. It may be significant that typical *Stenepteryx hirundinis* (Linné) occurs on swallows; while a form regarded either as a race of *hirundinis* or as a distinct species (*cypseli* Rondani) lives on swifts (Apodidæ or Micropodidæ). All known species of *Cratœrina*, *Myophthiria* and *Brachypteromyia*, on the other hand, are restricted to the Apodidæ. It seems reasonable to assume that the ancestors of these swift-flies were swallow-flies and that the change of hosts — from swallows to swifts — was in some way responsible for the series of morphological changes eventually culminating in *Brachypteromyia*. As in most such cases, the mechanism of these changes is a matter of speculation; but the end result is readily recognized as an efficient adaptation to the peculiar morphology and habits of the host.

Swallows and swifts are amongst the most aërial of birds, with the swifts by far the speedier of the two groups. Some species of swifts are possibly the fastest birds for their size, capable of reaching 70 to 100 miles per hour.[2] Both swallows and swifts are also capable of long-sustained flight, as they catch their food on the wing; but, again, the swifts spend much longer periods in the air, some species being unable to perch. When not nesting, some swifts must stay aloft for the major part of the day, at one stretch. In swallows and even more so in swifts, the narrow, pointed wings, very long in proportion to the small body, and often the more or less forked tail (the fork capable of opening and closing) are clearly adaptations to a predominantly aërial life. The body, particularly the head, is built so as to offer the least resistance to the air and is perhaps a little more "stream-lined" in the swifts than in the swallows. The plumage is very even and smooth at the surface. That of the swifts is usually coarser, stiffer, with less down on the bases of the body-feathers, than that of the swallows.[3] Several of these features explain well the peculiarities of the parasitic flies of these birds. The wings of the flies have become reduced or atrophied, because on birds travelling at high speed they increase the risk of the fly's being blown off the host. They are, moreover, of little use for reaching a new host, on birds spending so much of their life in mid-air and far away from the nest.[4]

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[2] Most published observations on the average and maximum speed of birds are unreliable, as they fail to take in account a number of important outside factors. The following data seem, however, to be fairly trustworthy. R. Meinertzhagen (1921, The Ibis, Ser. 11, III, pp. 232 and 237) gives the observed speed of a Mesopotamian swift (species?) as 68 miles per hour and estimates that of the alpine swift, *Apus melba* (Linné), as 70 to over 100 miles per hour. A. Magnan (1922, Ann. Sci. Nat., Zool., Ser. 10, V, p. 167) includes the European swift, *Apus apus* (Linné), with the European swallows and martins in a group of high-speed birds averaging 45 to 80 miles (80 to 150 kilometers) per hour. E. Stresemann (1931 and 1934, in Kükenthal, Handbuch der Zoologie, VII, pt. 2, pp. 584 and 837) gives the speed of the Asiatic swift, *Hirundapus caudacuta* (Latham), as 80 miles (144 kilometers) per hour. J. P. Chapin (1939, Bull. Amer. Mus. Nat. Hist., LXXV, p. 464) observed the Ruwenzori alpine swift, *Apus melba maximus* (O.-Grant), shooting by at a terrific speed and was tempted to estimate its velocity at about 100 miles per hour.

[3] These and other adaptive peculiarities of swifts and swallows were acquired independently, as the two groups are not related in the opinion of modern ornithologists. The Hirundinidæ are placed in the order Passeres, and the Apodidæ in the order Macrochires. Fossil Apodidæ are known from the Oligocene to date (possibly from the Upper Eocene) (K. Lambrecht, 1933, Handbuch der Palaeornithologie, p. 621).

[4] The larvæ of *Stenepteryx* and *Crataerina* are known to be laid in the nests of the host, where they hatch. In colder climates, some of the puparia remain unchanged through the winter, after the birds have migrated. They hatch upon

The lengthened head and much flattened, nearly wingless body enable the insect to glide swiftly in the dense, coarse plumage, where it can grasp a firm hold with the unusually strong legs and the long, deeply split claws. The many long stiff hairs covering body and legs also help the fly to adhere to the feathers, endowing it with the properties of a burr. The obsolescence of the thoracic sutures is the result of the disuse of the wings and is not directly useful to the insect. The same is true of the reduction of the eyes and the loss of ocelli, which seem to be sequels to the loss of the power of flight.[5]

Brachypteromyia fimbriata (Waterhouse)

Anapera fimbriata Waterhouse, 1887, Proc. Zool. Soc. London, p. 164, fig. (on p. 163) (Fort Wingate, New Mexico, off "*Cypselus melanoleucus*" = *Aëronautes saxatilis* Woodhouse; no sex given, but evidently ♀). Shufeldt, 1887, The Ibis, (5) V, p. 157, footnote; 1894, The Auk, XI, p. 186. Aldrich, 1923, Insec. Insc. Menstr., XI, p. 78.

Brachypteromyia fimbriata Speiser, 1899, Wien. Ent. Zeitg., XVIII, p. 202, footnote; 1900, Ann. Mus. Civ. Genova, XL, p. 555. Bezzi, 1916, Natura, Riv. Sc. Nat., VII, p. 179. Austen, 1926, Parasitology, XVIII, pt. 3, p. 359 (♀ type, at the British Museum).

Brachyptomyia fimbriata Speiser, 1907, Ent. News, XVIII, p. 104.

Brachypteromia fimbriata Aldrich, 1907, Jl. New York Ent. Soc., XV, p. 6.

Myiophthiria fimbriata Ferris, 1928, Pan-Pacific Entom., IV, p. 140, figs. 1–2 (♀ ♂; Tuba, Arizona; off *Aëronautes melanoleucus*" = *Aëronautes saxatilis*).

Brachypteromyia femorata Williston, 1896, Ent. News, VII, p. 185 (♂; Wyoming; off "*Macropis melanoleucus*" = *Aëronautes saxatilis*). Bezzi, 1900, Rendic, Ist. Lombardo Sc. Lett., (2) XXXIII, p. 522. Aldrich, 1905, Cat. North Amer. Dipt., p. 656.

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the return of the host. Both swallows and swifts often seek the same nest several years in succession.

[5] I am indebted to my friend Dr. James P. Chapin for valuable information concerning the habits and adaptive features of swallows and swifts, in so far as they may have influenced the evolution of their parasitic flies.

Specimens Examined. — NEW MEXICO: Fort Wingate, 2 ♀, one the holotype at the British Museum, off *Aëronautes saxatilis* (R. W. Shufeldt Coll.). — COLORADO: 1 ♂ off *Aëronautes saxatilis*, without more definite locality (collected in May 1882 by Joel Allen. — M. C. Z.). — UTAH: Kanab, Kane Co., 1 ♂ off *Aëronautes saxatilis* (July 1934; W. J. Breckenridge Coll. — Univ. of Minnesota). — The collection of the M. C. Z. also contains two specimens (♀ ♂) received from Osten Sacken, without locality, but with the host record, "off *Nephoecetes niger* (Gmelin)." This is a swift, a race of which (*borealis* Kennerly) occurs in western North America from southeastern Alaska to southern Mexico. Most probably Osten Sacken's specimens came from California. The species is also known from Wyoming.

The following differences have been noted between *B. fimbriata* and the new South American species described in this paper. Head relatively broader, more nearly elliptical, scarcely longer than its greatest width. Inner orbit narrower, about as wide as mediovertex before the postvertex; frontal bristles spread over a wider area, which expands both at the upper and lower ends; 2 to 4 vertical bristles in the upper corner, which is somewhat set off from the remainder of the side of the frons. Postvertex shorter and broader, more semi-elliptical, much shorter than mediovertex. Appendage of second antennal segment longer and narrower, about two and one-half times as long as greatest width, widened about mid-length, bluntly rounded off at tip. No trace of median notal suture. Metapleural ("pleurotergal") protuberance barely indicated. Wing much longer and narrower, more elliptical, about one and one-half times as long as wide; rudimentary venation more distinct. A much smaller fly: total length in dried condition, 6 mm.; from tips of fronto-clypeus to hind margin of scutellum, 3.2 mm.; of wing, 1 mm. In the male the parameres are present and shaped almost exactly as in the Neotropical species.

Brachypteromyia neotropica, new species. Fig. 1

Male. — Head broadly oval, about one and one-fourth times as long (from tips of fronto-clypeus to occipital margin) as greatest width. Frons at its narrowest nearly six times as wide as the eye; inner orbits (parafrontalia) very wide (before the postvertex slightly wider than mediovertex), conspicuously but gradually narrowed anteriorly, the inner margins strongly diverging anteriorly; frontal bristles many, in two or three irregular rows, crowded in a regular narrow strip near the inner margin and extending over the anterior three-fourths of the inner orbit; a fringe of long bristles at the edge of the outer orbit, near and behind the eye; 6 or 7 very long vertical bristles in the upper corner of each inner orbit. Postvertex (vertical triangle) triangular with obtuse and somewhat ogival anterior angle and laterally produced side angles, the hind margin nearly straight; slightly shorter than mediovertex, flat, smooth, without rudimentary ocelli, pits or depressions. Fronto-clypeus long and broad, slightly shorter than its distance from the occipital margin, fused laterally with the base of the antenna; fronto-clypeal suture barely indicated; base of clypeus very broad and short, its antero-lateral arms short, separated by a broad but shallow inward curve; frons proper with a minute and shallow median pit close to the fronto-clypeal suture. Mediovertex well developed, much broader anteriorly, with wide antero-lateral extensions separating the genæ from the fronto-clypeus. Eye of many facets, small, nearly elliptical, occupying a little over one-third of the upper side of the head, seen from above about twice as long as wide, about twice as far from the postvertex as from the fronto-clypeus. Palpi about as long as clypeus, but mostly retracted within the buccal cavity; only the short tips visible from above. Antenna large; first segment with a group of 3 to 6 long bristles in the inner anterior corner; appendage of second segment nearly twice as long as wide, flat, broadly rounded off at apex, densely covered with many long bristles; protruding arista of third segment (beneath the appendage of the second) much flattened, elongate paddle-shaped. Ventrally, the latero-anterior areas of the head (corresponding to the parafacialia and facialia) bear many long bristles (vibrissæ) in several rows, crowded along the inner (buccal) margin; the latero-posterior areas (cheeks) bear two long setæ on each side. Thorax wider before the wings than long from tip of humeral angle to base of abdomen; humeral margin very deeply, but broadly curved inward. Humeral callosity broad, flat, obtusely rounded off, separated by a shallow inward curve from the more prominent preälar angle. Pro-mesonotal suture distinct, but in dorsal view visible only medially behind the occipital margin; scuto-scutellar suture

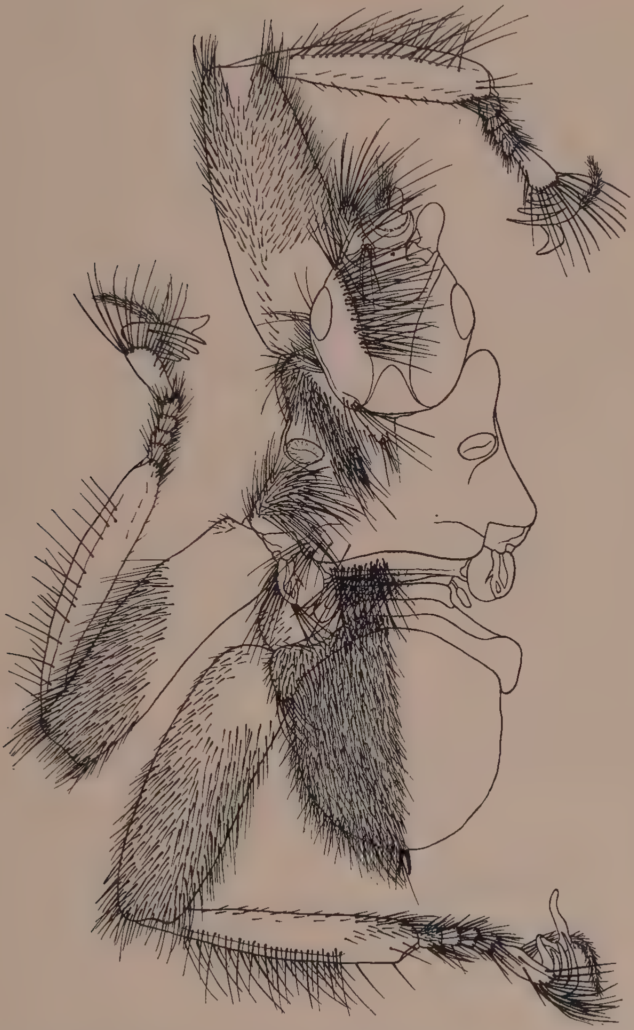

FIG. 1. *Brachypteromyia neotropica* J. Bequaert n. sp. Male holotype in dorsal view. Pilosity omitted over right half.

deep; a distinct suture divides the notopleuron from the epipleurites at the base of the wing; posthumeral suture marked on the sides only, behind and close to the spiracle; transverse mesonotal suture placed far back and weakly marked only over the lateral third; notal suture weakly indicated anteriorly; other dorsal sutures obsolete, the humeral callosities and notopleura fused with the mesoscutum medially. Scutellum very wide and short, with nearly parallel anterior and posterior margins, superficially divided by a transverse depression. Metapleuron with a short, conical, blunt, so-called "pleurotergal" protuberance, hidden in dorsal view by the wing. Mesothoracic spiracle very large, entirely dorsal; metathoracic spiracle large, between the metapleural protuberance and the hind coxa. Dorsal chætotaxy of patches of long bristles, scarcely corresponding to the customary grouping: a dense oblique patch on the humeral callosity to beyond the spiracle, ending far from the middle of the mesoscutum, but with a narrow extension across its anterior part (somewhat behind the humeral margin); a dense patch over most of the notopleuron; 6 or 7 long bristles (postalars) close to the wing, behind the transverse mesonotal suture, and more medially a row of 3 bristles (prescutellars); many long scutellars in several irregular rows on the disk and a row of similar bristles on the hind slope of the scutellum. Prosternum divided by a deep triangular notch into two broad lobes, bluntly rounded at apex, bare. Mesosternum broader than long, with a longitudinal furca, bare except for a narrow patch of setæ on each side before the mid coxa. Metasternum divided into an anterior basisternum (before the hind legs) and a narrower, posterior sternellum (between the hind coxæ); basisternum with a longitudinal furca ending posteriorly in a deep pit, with only a narrow cross-patch of setæ (broadly interrupted medially) near the hind margin; sternellum deeply depressed medially, saddle-like, bare. Legs very long and stout; fore and mid pairs about alike, hind pair slightly longer. Coxæ short, with many short setæ and several long bristles. Trochanters short, with a few short setæ near apex. Femora fairly evenly swollen throughout, bare ventrally, covered dorsally with many stiff hairs and bristles, leaving bare a broad basal area (more extensive on mid and less so on hind pair). Tibiæ flattened, dorsally with a superficial longitudinal groove bearing a row of erect bristles; a similar row of bristles near the outer lower edge; a few short setæ elsewhere; apices ventrally with a patch of strong bristles, but without spurs proper. Tarsi short and broad; basal segments with many short stiff bristles; apical segment much longer and broader than the others, with very long setæ, mostly in a transverse dorsal row at the apex. Claws symmetrical, unusually long, very deeply divided into three slender teeth, the basal "heel" being long and narrow; two broad, pad-like, bare pulvilli; one long, slender, feathered empodium. Wing very short, pad-like, about twice as long as scutellum, scarcely longer than wide; venation crowded over the anterior or outer half, of 2 or 3 thick longitudinal veins (probably formed by fusion of several veins); costa very thick, with many long bristles on basal two-thirds and at apex; other veins bare; membrane bare. The venation is decidedly more reduced than in *B. fimbriata*. Halteres well developed, borne on long stalks. Abdomen (in dried, contracted condition) short, densely hairy both above and below. A short, moderately broad basal tergite (next to the thorax), covered with minute setæ; behind this a much wider sclerotized tergite, with incurved hind margin and broad side lobes, covered with short, stiff setæ, with a row of long bristles at the hind margin and a patch of even stronger ones at the tips of the side lobes. A short, setulose basal sternite. No other sclerotized tergal or sternal plates can be made out on the membranous abdomen. Parameres of terminalia straight, slender, rod-like, very gradually widened toward base, blunt at apex.

Length: total, in dried condition, 9 mm.; from tips of fronto-clypeus to hind margin of scutellum, 5.6 mm.; of wing, 0.8 mm.

VENEZUELA: Galipan, close to Pico del Avila, Estado Miranda, at about 2,000 m. altitude; male *holotype*, off a square-tailed swift, *Aëronautes montivagus* (d'Orbigny and Lafresnaye). Mus. Comp. Zöol., Cambridge, Mass.

The differences between *B. neotropica* and the only other known species have been given under *B. fimbriata*.

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